SEVENTEENTH ANNUAL REPORT

OF THE

STATE BOARD OF HEALTH,

OF THE

STATE OF RHODE ISLAND,

FOR THE YEAR ENDING DECEMBER 31, 1894,

AND INCLUDING THE REPORT UPON THE REGISTRATION OF

BIRTHS, MARRIAGES AND DEATHS IN 1893.

PROVIDENCE, R. I.
E. L. FREEMAN & SONS, STATE PRINTERS.
1896.

MEMBERS

OF THE

RHODE ISLAND STATE BOARD OF HEALTH.

	Post Office Address.	
ALBERT G. SPRAGUE, M. D., *President*	RIVER POINT	KENT COUNTY.
SAMUEL M. GRAY, C. E.	PROVIDENCE	PROVIDENCE CO.
PAUL S. REDFIELD, M. D.	PROVIDENCE	PROVIDENCE CO.
REV. GEORGE L. LOCKE	BRISTOL	BRISTOL COUNTY.
ALEXANDER B. BRIGGS, M. D.	ASHAWAY	WASHINGTON CO.
PETER F. CURLEY, M. D.	NEWPORT	NEWPORT COUNTY.
GARDNER T. SWARTS, M. D.	PROVIDENCE	PROVIDENCE CO.

GARDNER T. SWARTS, *Secretary*.

GENERAL CONTENTS.

To the Honorable the General Assembly:

In compliance with the Public Statutes, the Annual Report of the State Board of Health is herewith respectfully submitted.

GARDNER T. SWARTS,
Secretary.

GENERAL REPORT.

The work performed by the State Board of Health during the year eighteen hundred and ninety-four has been a continuation of the methods of study of the various conditions pertaining to the health of the community, and with a view to the prevention of disease.

The report differs from previous reports in the omission of reports from various medical correspondents located in different parts of the State. Heretofore it has been customary to obtain the opinion of a single practitioner as to the prevalence or increase of different diseases in certain limited areas.

From a comparison of the return of deaths from certain diseases with these reports it was frequently observed that an increased mortality of certain diseases actually existed, while the report from the correspondent would indicate that this disease was not especially prevalent. To those familiar with a general medical practice this result is readily understood, inasmuch as it frequently happens that one practitioner will have a large number of cases of a particular disease, while from no apparent reason his colleagues may not have a single one, the conditions being reversed at other seasons of the year and with other diseases.

It is apparent, therefore, that a report from one individual cannot give the actual prevalence of any disease, even over a limited area, unless the disease is present in epidemic form. The only positive means whereby reports of this kind may be made reliable is by the report of the actual number of cases by each practitioner, and this, for obvious reasons, is impracticable, not only from lack of time on the part of the busiest physicians, but also from a natural reticence as to the private concern of the physician.

Inasmuch as most of the towns are now provided with ordinances and health officers controlling the special contagious diseases, reports of these diseases are available and have been made a part of the study of the Board during the year. While all cases are not reported, the custom is becoming more common, and much valuable data will be com-

piled by the continuation of these reports from year to year. As the knowledge of the working of these diseases is more fully understood, and as they are in that class considered as preventable diseases, they are the more valuable and should receive most attention, and it should be the aim of health officers and physicians to see that all of this class of diseases are reported promptly and fully.

The reports from the various health officers, and from the city and town clerks, as to the conditions prevailing in their respective districts have been continued, and will be of value to these officers by comparison as to the methods in practice in other towns in the State.

An unusual interest has been manifested by the health officers during the year, not only in the control of contagious diseases, but in the investigations of nuisances.

A new departure for the Board, but one of great importance to the State as well as of service to the Board, has been the examination of various water supplies. It was the desire and intention of the Board to make periodical examinations of all the different sources of supply in the various towns.

It has been necessary, however, to limit the extent of these examinations, and only a few sources have been examined. These have included the Pawtuxet river at three locations along the river, a single sample only from the Newport, Block Island, and Narragansett Pier supplies, and several from the Woonsocket supply.

As a continuation of the study of the State Board of Health of Massachusetts of the contamination and subsequent purification of water as existing in the Blackstone river below Worcester, two samples have been taken from the Blackstone, at different points, monthly.

Among other work done by the Board has been the inspection by the Secretary of small epidemics—unusual prevalence of typhoid fever in the town of Lincoln and in Anthony village. Also an inspection of the State camp for militia, and the annual inspection of the summer hotels, which has been of service.

During a heavy drought the condition of the water supply of the city of Woonsocket became questionable, and an examination of the water shed and analysis of the water was made by the Board through the Secretary. A report of the inspection is appended.

Small-pox occurred in the city of Providence during the year, some of the cases necessitating coöperative work with the superintendent of health of that city. A report of these cases will be found in the report from Providence.

The use of anti-diphtheritic serum, or anti-toxin, was begun by the Board during the last month of the year.

The free examination of sputum for physicians, in doubtful cases of tuberculosis, was commenced, as also the examination of secretions from the throat in cases of diphtheria.

In the way of legislation, laws have been asked for, and have been granted by the Legislature, increasing the value of mortality statistics and causes of deaths in medical examiner cases. The usual opposition has been presented against the endeavor to abolish compulsory vaccination of school children. An appropriation of one thousand dollars was granted to the Board for the especial object of investigation of tuberculosis in man.

The Secretary has endeavored to continue the issue of the Monthly Bulletin, when the more important work of the Board would permit.

PERSONNEL OF THE BOARD.

The term of membership of Mr. Samuel M. Gray, C. E., of the city of Providence, member from the county of Providence, expired by limitation July 1st, 1894.

Governor D. Russell Brown, at the January session of the General Assembly, with the advice and consent of the Senate, reappointed Mr. Gray for a term of six years from July 1st, 1894.

MEETINGS OF THE BOARD.

During the year there were held the regular quarterly meetings, which were well attended, and much advanced work recommended and reported upon.

At the January meeting the Secretary referred to the request of the Governor for a report of the work of the Board, and for requirements and recommendations for the coming year. Upon consideration it was determined that the Secretary should present the following desires and intentions of the Board:

"As great danger frequently exists in waters delivered for drinking purposes, it is desirable that control should be kept upon the dealers in these supplies, by frequent analyses of the waters so supplied. This should include water taken from private springs and wells, as well as rivers from which a city or town supply is taken

Since a large number of people are annually entertained in this State

at the various important watering places, and as this is a source of a large and important revenue to the inhabitants of many parts of the State, it would seem desirable that these hotels should receive inspection yearly or oftener, and assistance given in every way possible to the proprietors in removing any sanitary defect either on their own premises or in the neighborhood of the hotels.

While the purity of the milk supply of this State is of a high quality, it must necessarily be depreciated by the constant increase of population, since the supply is not materially increased.

The Board would, therefore, recommend that this quality be maintained, and that the present standard be raised to correspond with that in neighboring States.

Inasmuch as the ice supplies of the various towns are collected from many sources outside of the towns in which it is delivered, and frequently outside of the State, and since it is possible with the exercise of due care in collecting the same to obtain a pure supply, it would seem advisable that some advisory control should be kept upon the dealers while gathering and delivering this commodity.

In the near future it is the desire of the Board to establish regular and systematic bacteriological analyses in different forms of contagious diseases, and to have at their command a ready means of establishing a diagnosis by that means in such diseases as diphtheria, typhoid fever, tuberculosis and cholera. It will, therefore, be necessary to have in constant working order a properly equipped laboratory for this purpose. Such a laboratory could be equipped at a small expense.

Inasmuch as the disease known as phthisis, pulmonary phthisis, pulmonary tuberculosis or consumption, is now accepted as a communicable disease, and since it is the cause of more deaths than any other disease, its spread or continuance may be controlled by intelligent sanitation, it would seem desirable that public laws should be enacted requiring that all cases of this disease should be reported by all physicians to the Secretary of the State Board of Health within a certain time after the establishment of a diagnosis."

At the quarterly meeting held in April the Secretary reported the inspection of a nuisance arising from accumulations of cesspool and privy vault wastes, on the border line between the town of Cranston and the city of Providence. The owner of the land was seen, and the material was plowed into the ground at once, and the nuisance abated. It was reported that a more strict control of the removal of night-soil by the towns of adjoining cities should be maintained.

The annual Registration Report for 1892 was reported as published, and was being delivered to the various State and town clerks. The report consisted of 94 tables and 271 pages. A large demand is being made for the reports, which the Secretary is trying to restrict to those who can make practical use of these statistics. The annual returns of births, marriages and deaths were nearly all in, and the tables for the Registration Report for 1893 were well under way.

It was reported that an attempt to annul the laws compelling the vaccination of public school children attending public schools was introduced in the Legislature early in the January session. It had been reported from the Committee on Special Legislation to which it had been referred, it having already passed the Senate. After three days discussion on the matter the bill was passed, reconsidered and finally indefinitely postponed by a vote of 21 to 21, the governing vote being given by the Speaker against the bill called the "Anti-Vaccination Bill."

The Secretary reported that he had brought the subject before the Providence Medical Association, and a committee had been appointed by that body to collect statistics and draught a circular to physicians of the association, which was sent out from the office of the Board. The matter was also brought to the notice of the Rhode Island Medical Society, and a committee was appointed to act upon the question.

The committees from both societies, as also the Commissioner of Public Schools, the Superintendent of the Public Schools of the city of Providence, the City Solicitor of the city of Providence at the order of the Board of Aldermen as a Board of Health of that city, also the Superintendent of Health of Providence, and the Secretary of this Board all appeared at the hearing, and spoke against the passage of the bill.

The Secretary also sent communications to the various health officers of the various towns of the State, urging them to give the matter attention, and to see individually their representatives.

At the regular quarterly meeting held in July the Secretary reported that as a result of his application for a change in the laws relating to births, marriages and deaths, whereby the returns of the same should be forwarded in the form of a copy by the various town clerks to the proper towns, when lodged with them by mistake, a law had been passed covering this necessity.

The law requiring the reports of views of medical examiners, quarterly, to the Secretary of the State Board of Health, had been passed at the request of the Board.

The appropriation of one thousand dollars, which had been asked for

to permit of an investigation into the subject of "Tuberculosis in Man," had been acted upon favorably.

It was voted that the Secretary be authorized to expend such sums of this appropriation, in the examination of sputum for physicians, in establishing a diagnosis of the disease, and in such other methods of investigation and study, as at times may appear to be desirable.

The Secretary of the Board called attention to the need of inspections of summer hotels, and upon motion it voted that Dr. Swarts be authorized to act as inspector of the Board, at the rate of five dollars per day, as provided for in Chapter 688 of the Public Laws.

Rev. Mr. Locke and the Secretary were appointed as delegates to the meeting of the American Public Health Association, to be held in Montreal, September twenty-fifth to thirtieth, and to make a report upon the proceedings to the Board at the next meeting.

At the quarterly meeting in October the Secretary reported that, under the investigation of "Tuberculosis in Man," he had prepared and sent to all the physicians in the State circulars of explanation of the intentions and desires of the Board, and asking for their coöperation in reporting cases of consumption or tuberculosis. A circular was also sent giving suggestions as to the care of the sputum, and one explaining the best method of collecting the same, and also blank reports in two forms, one for cases where the sputum was to be examined and to accompany the sample when sent in, and also one for cases where only the history of the case was necessary.

The results thus far had been the report of 24 cases of suspected tuberculosis. Of these the sputum was examined in 22 cases. Of these, in 13 cases the bacillus of tuberculosis was found to be present, and absent in 9 cases. In some of these cases there was only a suspicion of the disease from the symptoms obtained by physical examination, and thus the physician in attendance was not only aided in the diagnosis, but the patient could avail himself of any advantages in the way of treatment at once, instead of waiting until the physical signs had so developed that treatment or change of habitation would not be of service.

Circulars were sent, in answer to an inquiry for examination, on regular forms such as are used by the board of health of the city of New York.

It was reported that the Secretary proposed to establish a card catalogue of all deaths from this disease, for one or more years, both by name and by location of premises, in order to make comparisons with future cases.

Water analyses have been made monthly of the water flowing in the Pawtuxet, one sample being taken from the north branch, one at the south branch, and one at the Pettaconsett pumping station. Also from the Blackstone river at two points. One also at Albion, and one at Central Falls.

Water from the reservoir of the Woonsocket Water Company, city supply, was examined at a time when the water had become very low owing to the small rain fall, and the sediment of the reservoir being mixed with the water gave a very poor result. Since the recent rains the water has risen, and a second sample taken from this supply shows considerable improvement.

Since the July meeting the Secretary, as ordered, had inspected all the summer hotels at Block Island and at Narragansett Pier, 22 at the former place and 14 at the latter. Most of the hotels at Block Island which kept a large number of guests were in good sanitary condition, while some of the smaller ones showed the intent of cleanliness. The water supplies of all, though suffering from the drought, were well located and the quality fair.

The town supply was examined at its source and also at the supply pipes, and an analysis of the water also made. An inspection of Great Salt Pond, which has been in question during the last quarter as a harbor, was made.

On the way to Block Island a sample of the city water supply of Newport was taken for analysis. The water from both these places was of good quality, especially when the low level of the reservoirs was considered.

At Narragansett Pier the sanitary conditions were as near perfect as could be within the part of the town used. A ladies' protective sanitary society had given considerable attention to the gathering of refuse, decaying fruit, scraps of paper, all being constantly collected by a man with a barrel on wheels. Bushel baskets were also painted green and nailed to buildings in conspicuous places, and into which most people threw their litter as they passed by.

The only objectionable point is the common dump which is concealed by the low buildings near the beach. Efforts are made to keep this in good order, but with only partial results.

The president of the council offered every assistance that the council could give, if any suggestions were forthcoming. The superintendent of the water works was visited and data obtained, and a sample of water for analysis. The result showed that the water was chemically

pure as far as contamination went, but that, owing to its source in a woody district. the color and taste was somewhat affected unfavorably, so that the consumers use as little of the water as possible, but are much pleased to pay for the fire privilege, hydrants being located all over the town. An inspection of the fire department showed a live interest in protection, hose, reels, ladders, and an organized company being provided.

There was a notable absence of fire escapes on many of the hotels, which should receive attention at an early date. Many from insurance advantages were providing them, while some few also provided extra supplies of fire hose.

A law should be passed providing for fire buckets, escapes and extinguishers in every hotel.

The season was an unusually busy one with every hostelry, all being full. It is estimated that about 10,000 guests were being accommodated during the summer months. This condition emphasizes the need of fire protection, for these hotels are one and all mere wooden structures which, with a gale of wind, could readily be consumed in a very short space of time, and also serve as a menace to the surrounding hotels.

An epidemic or outbreak of typhoid fever at the village of Anthony was investigated, and found to be due to contamination of the well by the family using it. Another, in the town of Lincoln, was found associated with the presence of low well water. Another, reported at Buttonwoods, was found to be due to other than local causes. Water from all these cases was analyzed, that at the first two being found to be especially bad, while at Buttonwoods the water was of a fair quality.

The report of the delegates to the American Boards of Health Association was presented in detail, and the advantages of the meeting shown and described. There was a large attendance, a great number of interesting papers were read, and many points of sanitary knowledge were obtained from individual health officers from other parts of the United States and Canada.

The Secretary called the attention of the Board to the work being done by the city board of health in New York city, in the study and control of diphtheria by an examination of the secretions of the throat in persons suspected to be suffering from that malady, and suggested the desirability of the Board undertaking this same work.

Upon motion it was voted that the Secretary be authorized to offer to the physicians of the State the privilege of a bacteriological examination of material taken from the throats of patients supposed to be

suffering from diphtheria, and to make reports of the results to the physician in charge of the case.

The subject of anti-diphtheritic serum was discussed.

The Secretary was authorized to negotiate for the hire or rental of a Hollerith tabulating machine, to facilitate the compilation of the deaths each month.

The Secretary was appointed as a delegate to attend the meeting of the Association of Boards of Health to be held in Washington, on December 12th, and to report to the Board.

HEALTH OF THE STATE IN 1894.

From the reports prepared for the *Monthly Bulletin* of the Board each month the condition of the public health during these months may be more definitely ascertained. The following extracts are taken therefrom.

January.

From the reports of the various medical correspondents throughout the State it is shown, that while bronchitis has increased in prevalence since the report made for the month of December, yet pneumonia has somewhat decreased in amount. This will be found to differ from the mortuary returns.

Epidemic influenza has materially increased beyond the amount of the previous month; but was declining during the last of the month. Whooping cough is reported as epidemic in East Providence Centre and East Greenwich. Typhoid fever is reported in large numbers in Warren.

The actual number of cases of contagious and infectious diseases, as reported to the various health officers, will be found upon another page.

An examination of the death returns shows that the whole number of deaths for the month of January was 778, which was 148 less than the same month in 1892.

There were a large number of deaths from diseases of the air passages. From bronchitis there were 28 deaths, or 3.59 per cent. of all; pneumonia, 125, or 16.06 per cent, and consumption, 65, or 8.35 per cent. Total of all diseases of the respiratory passages, 218, or 28.02 per cent.

From influenza there were recorded 112 deaths, or 14.39 per cent. of all. This is 76 more than the previous month, and 86 less than during

the same month in 1892, at which time there was the greatest mortality from the influenza pure and simple.

From apoplexy there were 25 deaths, or 3.21 per cent.; diseases of the heart, 46, or 5.91 per cent.; typhoid fever, 20, or 2.57 per cent.; scarlet fever, 25, or 3.21 per cent.

This month, for the first time in the history of the *Monthly Bulletin*, returns have been made by the entire thirty-seven towns of the State.

The difficulties which have been presented in obtaining a complete record have appeared to be a delinquency, or lack of interest on the part of the undertakers, from whom all reliable information must come to the town clerk.

The town clerks of the various towns, as well as many of the undertakers, are now making more of an effort to assist in bringing these records to a condition where their value can be utilized.

This method of monthly returns not only serves to give the correct conditions of mortality, but, what is of even greater value, it permits the corrections of errors and omissions which could not be looked up in the year next succeeding, when the annual returns are made, owing to removal or lack of memory of the attending physician or members of the family.

Any assistance which can be given to the town clerks, undertakers, and physicians, in making these returns, will be always cordially tendered them from this department.

February.

From the reports of the various medical correspondents throughout the State, it is shown that influenza has decreased materially in amount and severity. Bronchitis and pharyngitis were especially prevalent throughout the State. The usual amount of pneumonia for this season of the year was reported.

The actual number of contagious and infectious diseases as reported to the various health officers, will be found on another page.

Whooping cough and chicken pox prevailed in East Greenwich, but was declining in East Providence; german measles has appeared in a number of towns. Scarlet fever has decreased somewhat in Providence city, and has increased in the town of Lincoln.

An examination of the death returns from all the towns shows that the whole number of deaths for the month of February was 569, which was only 26 less than during the same month in 1892, and represents a

death rate of 1.64 deaths to every 1000 of the population (census of 1890). This number is 209 less than for the month of January 1894, from which it may be inferred that the amount of general sickness is reduced nearly one-half from that of the previous month.

The number of deaths from the diseases of the air passages were: From bronchitis, 29 deaths, being one more than in January, and 8.2 per cent. of all deaths; pneumonia, 80 cases, which was 45 less than in January, and 14.1 per cent. of all. Total of all diseases of the air passages, 156, or 52 less, and 27.42 per cent. of all.

From influenza there were returned but 32 deaths, which was 80 less than in January and represents but 5 per cent. of all. From apoplexy, 16, or 9.84 per cent.; diseases of the heart, 29, or 4.41 per cent. Old age, 24, or 5.6 per cent.; diphtheria and croup, 22, or 3.86 per cent.; scarlet fever, 18; typhoid fever, 8.

March.

From the reports of the various medical correspondents throughout the State, it is shown that influenza is still present throughout the State, though in a decreased amount. Bronchitis is especially prevalent in Bristol county and in Pawtucket. Measles in Pawtucket and German measles at River Point and in Scituate.

The actual number of contagious and infectious diseases as reported to the various health officers will be found upon another page.

Scarlet fever has decreased in the town of Lincoln; remains about the same in the city of Providence. Typhoid fever has materially increased in Providence.

An examination of the death returns from all the towns shows that the whole number of deaths for the month of March was 572, which was but three more than the month previous, and ten less than in the same month in 1892, and 67 less than the monthly average for this year. It represents a death rate of 1.65 deaths to every 1000 of the population (census of 1890).

The number of deaths from bronchitis was 30, being but one more than last month, and 5.24 per cent. of all deaths; pneumonia, 64 cases, which was 16 less than in February, and 11.18 per cent. of all.

The number of deaths reported from tuberculosis were reported as follows: Phthisis pulmonalis, 39; pulmonary tuberculosis, 4; general phthisis, 35, general tuberculosis, 3, making a total of 81 deaths, of which 43 were described as implicating the lungs only, and 38 where

the disease was general. This is 28 deaths more from tuberculosis than the previous month and 12 more than the monthly average this year, and 14.16 per cent. of all deaths.

From apoplexy there were reported 19 deaths, or 3.32 per cent.; from heart disease, 46, or 8.04 per cent.; diphtheria, 13; scarlet fever, 9; typhoid fever, 9; whooping cough, 13.

April.

From a report of the medical correspondents throughout the State it is shown that the following diseases were more prevalent in certain districts.

Bronchitis, total 50 cases, most prevalent in Bristol and Hope Valley, also in nine other towns to a less degree; Influenza, a sudden increase in Warwick; Pneumonia, total 39 cases, largest number in Scituate and Carolina; Measles reported nearly epidemic in East Providence; German measles reported epidemic in Middletown, and a large number of cases in Scituate. A number of correspondents report the amount of general sickness greater than usual.

An examination of the death returns of all the towns shows that the whole number of deaths for the month of April was 575, which was but three more than the month previous, and seven less than the same month in 1892, and a monthly average for this year of 623.

There were 16 deaths from apoplexy and nine from cerebral hemorrhage, making 25, or 4.34 per cent. of all. From bronchitis there were 28 deaths, or 4.86 per cent. of all; from pneumonia, 85, or 14.77 per cent., and from tuberculosis of the lungs, 50, or 8.86 per cent.; of the air passages, 164, or 33.73 per cent. From tuberculosis of all forms, including meningitis, peritonitis, tabes mesenterica, general tuberculosis and pulmonary make the number of 58, or 10.08 per cent. From diphtheria there were 13; from scarlet fever, 12; from typhoid fever, 12, and from whooping cough 14 deaths.

May.

From a report of the medical correspondents throughout the State it is shown that the following diseases were more prevalent in certain districts.

Bronchitis, total 40 cases, most prevalent in Richmond, Coventry and Warwick, also in seven other towns to a less degree; influenza re-

ported only in Glocester, ten cases; pneumonia, total 29 cases, largest number in Coventry; six cases of measles in Carolina, but three other cases in other towns; six cases of German measles in Warwick and a few remaining cases in East Greenwich; tonsilitis reported only in Warren. From 25 to 30 cases of "lung fever" in children are reported in three villages of Scituate—Chopmist, Rockland and Richmond. A few correspondents report the amount of general sickness as larger than in April.

An examination of the death returns shows that the whole number of deaths for the month of May was 575, which was the same number as in the preceding month and sixty less than the same month in 1893, and a monthly average for this year of 613.

There were twenty deaths from apoplexy and 7 from cerebral hemorrhage, making 27 or 4.70 per cent. of all.

From bronchitis there were 18 deaths, or 2.39 per cent.; pneumonia 54, or 9.39 per cent., and from tuberculosis of the lungs 74, or 12.87 per cent. Total of the air passages 146, or 25.39 per cent. of all.

From tuberculosis in all its forms, including intestinal, laryngeal, pulmonary and general tuberculosis, there were 77 deaths, or 13.39 per cent.

From diphtheria, including membraneous croup, there were 10; from scarlet fever 14; typhoid fever 8, and whooping cough 8.

As the result of accident there were 17 deaths; from cancer 16; 51 from diseases incident to infantile debility; 47 from diseases peculiar to the heart.

June.

From a report of the medical correspondents throughout the State it is shown that the following diseases were more prevalent in certain districts.

Bronchitis, total, 25 cases, most prevalent in Barrington and Glocester, also in five other towns to a less degree; pneumonia, total, 12 cases, largest number in East Providence; measles reported only in Barrington; German measles reported only in Glocester; diarrhœal diseases, total 50 cases, 28 being in Richmond. A number of correspondents report the amount of sickness small—considerable decrease from last month.

An examination of the death returns shows that the whole number of deaths from the thirty-seven towns in the State was 531 for the month

of June, which was 44 less than the month previous, and with a monthly average for this year of 596.

There were 10 deaths by accidents, 5 of which were by drowning. By cancer of various localities, 21, or 3.52 per cent. By various forms of dementia, 15; from diseases of the heart, 33, or 5.53 per cent.; of the kidneys, 15, and of the brain, 10.

From bronchitis there were 11 deaths; pneumonia, 18; and tuberculosis of the lungs, 45, or 7.55 per cent.; of the air passages, 74, or 12.41 per cent.; from infantile diseases, 71, or 11.91 per cent.; 34, or 5.70 per cent. of which were from cholera infantum. This is 8 more than during the same month in 1893, and 32 more than the monthly average for 1894. From tuberculosis in all forms, including meningitis, general and pulmonary, there were 58. From diphtheria there were 14 deaths, from scarlet fever 2 only, and from typhoid fever 9.

July.

The usual diseases incidental to an increase in temperature are presented in this month's returns of deaths, while diseases of the lungs and air passages have been reduced in number.

An examination of the death returns will show that there was a total of 841 deaths, which was 310, or 37 per cent. more than the total for the preceding month. For the corresponding month in 1893 there were only 738 deaths, or 103 less. The monthly average for 1894 has been 634, which makes the month rank higher than any month of July for seven years. The only larger mortality in any one month for the last seven years was during the epidemic of influenza in January of 1890 and 1892.

From accidents there were 23 deaths, or 2.73 per cent. of all deaths. Twelve of these or more than one-half were the result of drowning.

From apoplexy and paralysis there occurred 23 deaths; from diseases of the heart, 40 deaths, or 4.75 per cent.; diseases of the kidneys, 31, or 3.68 per cent.; old age, 19.

Of diseases of the air passages there were 291, or 2.49 per cent.; from pneumonia and from bronchitis, 16. From pulmonary phthisis there were 55 deaths, and from all forms of tuberculosis, 66, or 7.84 per cent., which is low. From cancer there were 24 deaths. From typhoid fever, 17; scarlatina, 5; diphtheria, 2; and whooping cough, 22, or 2.6 per cent.

The greatest mortality was in the division of diseases of infancy, and

which numbered 278 or 33.05 per cent. of all. Of these 197 or 23.42 per cent. died of cholera infantum. This is nearly one-fourth of the whole. In June there were but 34 deaths from this cause. In July, 1893, there were 183 deaths, the average for 1894 by months has been 50.

August.

While a large number of deaths occurred from the diseases common to the Summer months, yet there was a marked decrease from the previous month.

A perusal of the mortality statistics for August will show that there were 620 deaths reported in all, which was 221 or 36 per cent. less than the total for the preceding month. In July the number was 841, and in June 531. The average monthly mortality for 1894 has been 632, so that the amount this month is not above the average.

The most prominent causes were: from violence; accidents, 26, or 4.19 per cent. Of these 7 were from drowning and 4 from railroad casualties, one from electric car and one from lightning. There were 3 suicides and one murder.

From apoplexy and paralysis there were 17 deaths, or 2.74 per cent.; from diseases of the brain, 28 or 4.51 per cent.; from diseases connected with the heart, 27 or 4.35 per cent.; from old age, 18 or 2.90 per cent.

Of diseases of the air passages, pneumonia caused 17 deaths and bronchitis, 10.

From phthisis there were 60 or 9.67 per cent. of deaths. From all tuberculous processes, 66.

Typhoid fever caused 9 deaths, scarlatina, 4, and whooping cough, 13.

September.

By reference to the returns of mortality, it will be seen that there were 583 deaths in the month of September. This is 37 less than the month previous, 99 less than the monthly average this year, and 34 less than the corresponding month of 1893.

From accidents there occurred 29 deaths, which is 4.97 per cent. of all. From apoplexy there were 17 cases; from diseases of the brain, 15; diseases of the kidneys, 25 or 4.28 per cent.; of the liver, 12. From bronchitis there occurred but 7 cases; from pneumonia, 27 or

4.63 per cent. From general tuberculosis, as well as pulmonary, there were 63 deaths or 10.80 per cent., which is an increase over the previous months. From cancer there were 19 cases. From disease coincident with infancy 135 cases, of these 52 were from cholera infantum. From old age, 21 cases.

From scarlet fever, 8; diphtheria, 8; typhoid fever, 11, and whooping cough, 11 cases.

Under accidents, there were recorded 2 from inhalation of illuminating gas; burning, 3. These occur frequently from clothing taking fire. Seven deaths occurred on the rail, one from electric car, one from overdose of Rochelle salts being dispensed by the druggist in bulk and the patient taking the full purchase at one dose. One infant died from over-dose of Russell's White Drops, a popular remedy for quieting and soothing infants, and which has been returned several times during the year as a cause of death.

October.

There were 528 deaths recorded in the State for the month of October. This is 55 less than the number recorded during the previous month—is 19 less than for the corresponding month in 1893, and is 89 less than the average for this year.

Of this number there were 15 deaths as the result of accidents. One of these was due to decapitation by two sections of boiler coming together; from electric car, 2, and overdose of medicine, 2.

From diseases of the brain there were 10 deaths, of the heart, 30, of the kidney, 24, and from old age, 16.

From diseases of the air passages there were 23; from bronchitis, 7; pneumonia, 21, and 58 from pulmonary tuberculosis.

From infantile diseases there were 104 deaths, of which number 21 were from enteritis and 25 from cholera infantum.

From typhoid fever there were recorded 17 cases, scarlet fever, 8, and diphtheria, 19.

November.

It will be ascertained by a perusal of the returns and causes of deaths that there were 482 deaths in November. This is 46 less than the number for the previous month, 19 less than the corresponding month in 1893, and 123 less than the monthly average.

The principal causes of death were as follows: From accidents there occurred 14 deaths. Of these one was from overlaying and 5 from railroad accident. From apoplexy 16 deaths, or 3.30 per cent. of all. From cancer, in various localities, 25, or 5.18 per cent. From disease of the heart, 27, or 5.60 per cent.; of the kidney, 13. From bronchitis, 15, pneumonia, 45, or 9.33 per cent. From phthisis, 49, or 10.16 per cent. From typhoid fever, 18, scarlet fever, 6, and from diphtheria, 14.

December.

By reference to the tables of returns of deaths for the month of December, it will be seen that there were 519 deaths, which is 37 more than for the previous month, which is 102 less than the corresponding month in 1893, and is 80 less than the monthly average for 1894.

The greater number of deaths were caused by diseases of the respiratory system. Of this number 50 were from pneumonia. This represents 9.78 per cent. of all. From bronchitis there were but 14 deaths. From diseaess connected with the heart and appendages there were 40 deaths, or 7.82 per cent. of all. From tubercular diseases there occurred 67. Of these 59 were from pulmonary tuberculosis, representing 11.54 per cent. of all. Of the infectious diseases there were 19 deaths from diphtheria, 6 from scarlet fever, 6 from typhoid fever, and 5 from whooping cough. There occurred 28 deaths from apoplexy and 22 deaths from diseases of the kidneys.

SECRETARY'S REPORT.

TOWN SANITATION.

1894.

REPORTS FROM TOWNS,

IN RELATION TO SANITARY IMPROVEMENTS, ETC.

It has been observed in the previous issues, that a complete annual report of a State Board of Health properly includes an account of the measures taken each year by the municipal authorities, corporations or individuals for the promotion of the health of the communities under their respective supervision or control. In order, therefore, to ascertain the facts in relation to such measures, and for the purpose of presentation in this Report, as in the reports heretofore issued, and in the continuance of the design to keep well informed of all proceedings throughout the State, on the part of town or city councils, or any form of municipal authority, in the appointment of health officers or boards of health, and in the direction of improvements which have in view and seem to promise the promotion of public health; by the abatement of nuisances; or the removal of unsanitary conditions and surroundings; or by the introduction of water for general use or construction of sewers; or the establishment of other public works, which may not only be of great public utility and convenience, but also serve in some measure, large or small, in the prevention of disease, the Secretary has, as heretofore, solicited replies from the town and city clerks of the several towns and cities, or other municipal officers, in answer to questions proposed in a circular sent for that purpose.

It is designed and hoped that a connected history may thereby be secured of all sanitary improvements of a public character in all parts of the State, from year to year; and the gradual awakening of the citizens of the different towns to the necessity of sanitary public measures thereby be shown; and also whatever intelligent appreciation of such necessity and whatever public spirit in existence in the towns there may be, may be known as manifested by the readiness with which needed sanitary measures are adopted.

The following is the form of circular sent at close of the year 1894:

CIRCULAR No. 130.

OFFICE OF SECRETARY STATE BOARD OF HEALTH,

48 WEYBOSSET STREET,

PROVIDENCE, R. I., Jan. 1, 1895.

To the Town Clerk:

It is, by statute law, made the duty of the Secretary of the State Board of Health to make inquiries of town or city clerks, or of the clerks of local boards of health, in regard to the general health and sanitary condition of the towns, and also in regard to measures taken for the improvement of the same.

The law reads as follows:

PUBLIC STATUTES, CHAPTER 83.

SEC. 6. The Secretary of the said Board shall make inquiry, from time to time, of the clerks of town and local boards of health, and practicing physicians, in relation to the prevalence of any disease, or knowledge of any known or generally believed source of disease, or cause of general ill-health, and also in relation to the proceedings of the said boards of health, in respect to acts for the promotion and the protection of the public health, and also in relation to diseases among domestic animals, in their several towns and localities respectively; and the said clerks of town and local boards of health, and said practicing physicians, shall give such information, in reply to said inquiries, of such facts and circumstances as have come to their knowledge.

The Secretary therefore respectfully makes the following inquiries:

1. Has any work for the promotion of public health been contemplated or completed in your town by the town authorities, or by private enterprise, during the year? If any, please state what.

2. If by introduction or extension of water service for general use, please state what proportion of the population, by estimation, was supplied with the same at the end of the year.*

3. If by sewerage, state what is the aggregate length of sewers, by estimation or otherwise, and about what proportion of the population had drainage connection with them at the end of the year.*

---

* If not known by the person replying, please state where or of whom such information may be obtained.

4. If by new ordinances in abatement of nuisances, or for any sanitary purposes, please send copy of same, also state how far, to your best knowledge, all the sanitary ordinances have been enforced. Copies of town ordinances especially desired.

5. Has your town any legal board of health beside the town council? If so, please give the names of the officers of the same.

6. Please give the names of the health officers of your town.

7. Has gratuitous vaccination been provided in your town during the past year? What proportion of the population was vaccinated, according to your best knowledge?

8. Have undertakers promptly sent in their returns of death? Please give names of any who do not. (See Public Statutes, Chap. 85, Sec. 1.)

9. Do clergymen make returns of marriages promptly each month as required by Public Statutes, Chap. 85, Sec. 4 ?

Thanking you in advance for your assistance, I am,

Yours truly,

GARDNER T. SWARTS, *Secretary.*

N. B.—The town or other clerk should charge a remunerative fee for replying to the above circular, and present to the town council or board of health, it being a service required by law.

BRISTOL COUNTY.

BARRINGTON.

1. There has been no work for the promotion of public health contemplated or completed in the town during the past year.

2. About one-fifth of the population is supplied with the water service.

3. The town has no sewage system.

4. The following was ordained by the town council:

Town Ordinance.

Section 1. Every physician having knowledge of the existence in the town of Barrington of any case of Asiatic cholera, typhus fever, typhoid fever, diphtheria, scarlet fever, smallpox or measles, or such other contagious or infectious diseases as the health officer may from time to time designate, shall make report in writing thereof to the health officer of Barrington within twenty-four hours after such knowledge, and said health officer shall forthwith take necessary precautions to prevent the spread thereof.

Sec. 2. Any physician who shall neglect or refuse to comply with preceding regulation shall be fined not less than one dollar, nor more than ten dollars for each day of such neglect after having knowledge of existence of any disease therein mentioned, or any other disease concerning which reports may be required by the health officer.

Sec. 3. Every householder in the town of Barrington in whose house any person is sick with any aforesaid diseases or other malignant or contagious disease unattended by a physician, shall immediately report the same to the health officer.

Sec. 4. Every householder who shall neglect or refuse to comply with preceding regulation shall be fined not less than one dollar, nor more than ten dollars for every case of such neglect or refusal.

Sec. 5. Whenever the health officer shall believe that there exists in the town of Barrington any case of malignant or contagious disease unreported as required in sections 1 and 3, he shall have authority to visit premises where such disease is supposed or suspected to exist, and to investigate the matter of such existence and to take proper precautions to prevent the spread of such disease, and he may, if necessary, call upon the town sergeant for assistance in making such investigation or in enforcing the observance of such precautions as may be deemed advisable.

Sec. 6. Whenever there is a case of scarlet fever or diphtheria in any house in Barrington, the health officer shall cause to be placed upon such house a card bearing the name of the disease therein existing, and such card shall not be removed except by permission of the health officer.

Sec. 7. No person living in a family where there is a case of smallpox shall attend school until the patient shall have passed the period of desiccation, nor until the house shall have been fumigated to the satisfaction of the health officer, nor without a permit from the health officer.

SEC. 8. No person living in a family where there is a case of scarlet fever shall attend school until at least five weeks from beginning of last case, nor until the house shall have been fumigated to the satisfaction of the health officer, nor without a permit from the health officer.

SEC. 9. No person living in a family where there is a case of diphtheria shall attend school until one week after recovery of last patient, nor until the house shall have been fumigated to the satisfaction of the health officer, nor without a permit from the health officer.

SEC. 10. No person living in a family where there is a case of measles shall attend school until one week after recovery of last patient, or without a permit from the health officer.

SEC. 11. The above regulations shall, when deemed necessary by the health officer, be extended to all persons living in the same house where any above named diseases exist, and said health officer may, in his discretion, extend the period of isolation specified in preceding sections.

SEC. 12. No person sick with German measles, mumps, chickenpox or whooping cough, shall attend school until after complete recovery.

SEC. 13. Permits referred to in preceding sections, shall be required by teacher in every case before the persons mentioned shall be admitted to school.

SEC. 14. The funeral of any person who has died from smallpox, scarlet fever, diphtheria or Asiatic cholera shall be private, and no person having the care or custody of the body of any person who has died from any of above-mentioned diseases shall do, or knowingly or wilfully permit to be done, any unnecessary act by which the spread of disease from such dead body may be caused or favored.

SEC. 15. Every person who shall violate any part of above section shall pay a fine of not more than ten dollars.

SEC. 16. Whenever it shall be made to appear to the health officer that any person has deposited or allowed to accumulate on premises owned or occupied by said person, or that any person has deposited on any public highway or in any place whatever, any decaying animal or vegetable matter, or other filth likely to injure the health of any of the inhabitants of Barrington, or, by the generation of noxious air to seriously annoy people of the neighborhood, said health officer shall give notice in writing or otherwise to said person to remove or abate at once such nuisance. If said matter be not removed or said nuisance abated within twenty-four hours, or within such time as the health officer shall deem sufficient after the receipt of such notice, the health officer shall direct the town sergeant to remove or abate the same, and the expense of such removal or abatement shall be paid by the town treasurer and afterward recovered from person depositing such matter aforesaid, in an action of debt brought in name of town treasurer, or, in place of such action of debt, a fine may be imposed of not less than one dollar nor more than ten dollars.

SEC. 17. Any decaying animal matter or other filth accumulating or having been deposited in any part of Barrington by unknown parties, may be removed or the nuisance thus caused abated by direction of the health officer, and at the expense of the town.

Respectfully submitted to town council by

DR. A. C. PEIRCE, *Health Officer.*

Approved and adopted by the town council of the town of Barrington at their meeting held October 1st, 1894.

MARK H. WOOD, *Council Clerk.*

5. The town has no board of health other than the town council.

6. Dr. Arthur C. Peirce is the health officer.

7. Gratuitous vaccination has been provided during the past year.

8. Undertakers have sent in their returns promptly.

9. Clergymen have made prompt returns of marriages.

BRISTOL.

1. The town council instructs the health officer to make a thorough examination of privy vaults and cesspools, and cause the same to be cleaned in proper manner. All complaints are investigated immediately.

2. There has been no extension of the water service.

3. The town has no public sewage system, the sewers being all private property, of which about one thousand feet were constructed last year.

4. Ordinances for the abatement of nuisances are enforced by the town council and health officer.

5. The town has no board of health other than the town council.

6. George H. Peck is the health officer.

7. Gratuitous vaccination was provided in this town and about thirty persons were vaccinated.

8. Undertakers in this town are very prompt in sending in their returns.

9. Yes.

WARREN.

1. There has been no special work in the town for the promotion of public health.

2. About one-third of the population was supplied with water at the end of the year.

3. There is no public sewage system but several private ones, with about five per cent. of the people in the compact part of the town are connected. There have been no changes in this respect during the past year.

4. There have been no new ordinances relating to sanitary matters.

5. The town has no board of health other than the town council.

6. Michael B. Conroy is the health officer.

7. Gratuitous vaccination has been provided for during the past year.

8. Undertakers have generally been prompt in sending in their returns.

9. Clergymen make returns of marriages promptly.

KENT COUNTY.

COVENTRY.

1. Citizens have shown interest in the better care of sink drains and privy vaults.

2. A large proportion of the families in Washington, Anthony, Quidnick, Harris and Arkwright are now supplied by the Pawtuxet Valley Water Co. and the Warwick and Coventry Water Co., but there have been no extensions in the water service during the past year.

3. The town has no public sewage system.

4. There have been no new ordinances.

5. The town council is the board of health.

6. Dr. Albert C. Richmond is the health officer.

7. No provisions have been made for gratuitous vaccination.

8. Undertakers and clergymen have made prompt returns.

EAST GREENWICH.

1. There has been no work for the promotion of public health completed. The introduction of sewers has been considered at two town meetings (June and August), but the introduction was defeated by vote.

3. There is no public sewage system.

4. The following ordinance was passed in March, 1894:

TOWN OF EAST GREENWICH.

AN ORDINANCE ENTITLED "HEALTH ORDINANCE."

Be it Ordained by the Town Council of the Town of East Greenwich:

SECTION 1. Every physician who shall attend a case of scarlet fever, diphtheria, small-pox, typhoid fever, or any other malignant, contagious disease in the town of East Greenwich, shall notify the health officer of said town within twelve hours after its occurrence, giving the location of each case.

SEC. 2. Every lodging house keeper, hotel keeper, house holder or person having charge of any public or private institution in said town in whose hotel or institution any person is sick with the aforesaid diseases or any other malignant contagious disease, unattended by a physician, shall immediately report the same to the health officer.

SEC. 3. No person living in any family wherein any person is afflicted with any of said malignant contagious diseases shall attend school without the permission of the health officer or the physician who shall be attending the case, and no person who shall have been afflicted with any of said malignant contagious diseases shall attend school until the health officer or the attending physician shall certify in writing that such sick person is convalescent and all danger from contagion is passed.

SEC. 4. No public funeral shall be held of any person who shall die of any malignant contagious disease, without the consent in writing of the health officer.

SEC. 5. No person shall tear down or deface any placard or flag which shall be put up on or near any dwelling house to give warning of the existence of any contagious disease in said dwelling house.

SEC. 6. Every person who shall violate any of the sections of this ordinance shall be fined not less than $5.00 nor more than $20.00.

SEC. 7. This ordinance shall take effect immediately from and after its passage.

By order of the council,

GEORGE A. LOOMIS, *Town Clerk.*

East Greenwich, R. I., March 29, 1894.

5. The town has no board of health other than the town council, in which John H. Keelin is council committee on matters pertaining to public health.

6. E. G. Carpenter, M. D., is health officer.

7. Gratuitous vaccination was provided and about nine per cent. of the population were vaccinated.

8. Undertakers and clergymen are prompt in making their returns.

WEST GREENWICH.

1. There has been no work for the promotion of public health during the past year.

2. There is no public water service.

3. There is no public sewage system.

4. There were no new ordinances passed.

5. The town council is the board of health.

6. There is no health officer.

7. No vaccination provided for.

8. Undertakers and physicians are prompt in making their returns.

WARWICK.

1. There has been no particular work for the promotion of public health during the past year.

3. There has been no extension of sewers.

4. The sanitary ordinances have been well enforced. (Contagious disease ordinance, see report of 1893, p. 45.)

5. The town council is the board of health.

6. Albert G. Sprague, M. D., is health officer.

8. Undertakers and clergymen are prompt in sending in their returns.

NEWPORT COUNTY.

JAMESTOWN.

1. There has been no work for the promotion of public health during the past year.

2. About two-thirds of the population is supplied with the public water service.

3. There are about two miles of sewers with which about one-half the population are connected.

4. The sanitary ordinances have been generally enforced.

At a meeting of the town council of the town of Jamestown, held March 24, 1894, the following resolution was passed, viz.:

Resolved. That any person who shall place or cause to be placed any unsightly material or anything detrimental to the health of the inhabitants of Jamestown, on any public road or shore, other than the place designated by law for the dumping of garbage, shall be fined ($5) five dollars for the first offence and ($10) ten dollars for the second.

Resolved. That the health officer be instructed to enforce this resolution.

WM. F. CASWELL, *Town Clerk.*

See also report 1893, p. 46.

5. The town council is the board of health.

6. Abbott Chandler is the health officer.

7. Gratuitous vaccination has not been provided.

8. Undertakers and clergymen are prompt in sending in their returns.

LITTLE COMPTON.

1. There has been no work for the promotion of public health during the past year.

2. There is no water service.

3. There is no sewage system.

4. There have been no new sanitary ordinances.

5. The town council is the board of health.

6. There is no health officer.

7. Gratuitous vaccination has not been provided for several years.

8. Undertakers and clergymen are generally prompt in making their returns.

MIDDLETOWN.

1. There has been no particular work for the promotion of public health during the past year.

2. There has been no extension of the water service.

3. Middletown has no sewage system.

4. There were no additional ordinances enacted in 1894 relating to the abatement of nuisances, or the betterment of sanitary conditions. Previous ordinances have generally been observed and enforced. (Contagious disease ordinance, see report 1893, p. 48.)

5. Middletown has only its town council for a board of health.

6. John Peckham is health officer.

7. Gratuitous vaccination has not been provided during the past year.

8. Undertakers and clergymen are prompt in sending in their returns.

NEWPORT CITY.

1. Do not know anything other than the usual general annual efforts of the authorities for the public welfare, except that a fat rendering establishment of many years standing was declared a nuisance, and its operation discontinued.

2. Water is supplied by a private corporation, the Newport Water Works.

3. Have not the information necessary for suitable answer, the street commissioner probably can afford the information needed.

4. No new ordinances in relation to nuisances or sanitary matters passed during the year.

5. The board of health elected by the city council annually: Christopher F. Barker, M. D., president; Francis H. Rankin, M. D., secretary; George C. Shaw, executive officer.

6. Henry Gladding is the health officer.

7. Gratuitous vaccination is furnished every year. Do not know the number or proportion vaccinated.

8. In order to obtain burial permits undertakers send returns of deaths to city council board of health, where they are retained for classification and report of diseases, and returned to city clerk after end of month. Do not know whether returns are promptly sent to that board or not. Probably must be as permit for burial must be had.

9. A few clergymen make returns promptly, it is not general; a few neglect them for months and occasionally entirely.

NEW SHOREHAM.

1. There has been no work for the protection of public health except the removal of ordinary nuisances and the enforcement of the laws relating to the same.

3. There is no public sewage system.

4. There were no new ordinances. (See ordinance, report 1893, p. 50.)

5. The town has no board of health other than the town council.

6. Alamanza Littlefield is the health officer.

7. Gratuitous vaccination was not provided for.

8. Undertakers and clergymen are prompt in sending in their returns.

PORTSMOUTH.

1. There has been no work for the promotion of public health during the past year.

3. There is no public sewage system.

4. There were no new ordinances.

5. There is no board of health other than the town council.

6. William T. Harvey is health officer.

7. Gratuitous vaccination was not provided for.

8. Undertakers and clergymen are prompt in sending in their returns.

TIVERTON.

1. There has been no work for the promotion of public health.

2. There is no water service.

3. There is no sewage system.

4. There were no new ordinances passed relating to sanitary affairs.

5. The town council is the board of health.

6. There was no health officer appointed.

7. Gratuitous vaccination has been provided to some extent, and about seven per cent. of the estimated population were vaccinated.

8. Undertakers and clergymen are prompt in sending in their returns.

PROVIDENCE COUNTY.

BURRILLVILLE.

1. There has been no work for the promotion of public health during the past year.

2. There is no public water service.

3. There is no public sewage system.

4. I think that the sanitary ordinances have been properly enforced. (See contagious disease ordinance, report 1893, p. 51.)

5. There is no board of health other than the town council.

6. Thomas Quinn is the health officer.

7. Gratuitous vaccination has been provided for school children but not for others.

8. Undertakers have been prompt in sending in their returns.

9. Clergymen as a class are prompt in sending in their returns.

CRANSTON.

1. There has been no work for the promotion of public health during the past year.

3. There is no public sewage system.

4. The sanitary ordinances have been well enforced. There have been very few complaints.

5. Dan O. King, M. D., and John Bigbee, chief of police, constitute the board of health.

6. Dan O. King, M. D., is the superintendent of health.

7. Gratuitous vaccination was provided for during the past year.

8. Undertakers and clergymen are prompt in sending in their returns.

CUMBERLAND.

1. There has been no work for the promotion of public health during the past year.

2. There has been no extension of the water service but about three-fourths of the population was supplied with the same at the end of the year.

3. There is no sewage system.

4. Contagious disease ordinance, see report, 1893, p. 53.

5. The board of health consists of the town council and the following members: George B. Haines, M. D., Thomas W. Hague, M. D., Alexander Marshall, Jr., M. D., Alvin F. Miller and William Dwyer.

6. George B. Haines, M. D., is the health officer.

7. I do not think that gratuitous vaccination has been provided.

8. Undertakers are fairly prompt in sending in their returns.

9. Clergymen do not make returns of marriage promptly.

EAST PROVIDENCE.

1. There has been no work for the promotion of public health in the town during the past year, except the rigid enforcement of the ordinance concerning swill, etc.

2. There has been no extension of the water service except the general putting in of services in new houses and places not heretofore supplied.

3. About a quarter of a mile of new (private) sewer has been added the past year; but a small portion of the population of the town has sewer drainage.

4. There have been no new ordinances, but all ordinances relating to public health have been enforced. (Contagious disease and garbage ordinances, see report 1893, p. 54.)

5. There is no board of health other than the town council.

6. Mason B. Wood is the health officer.

7. Gratuitous vaccination has been provided the past year.

8. Undertakers at present are making very prompt returns.

9. As a rule the clergymen are prompt with their returns, although one clergyman held his returns for several months during the past year, but will do better in the future.

FOSTER.

1. There has been no work for the promotion of public health during the past year.

2. There is no public water service.

3. There is no public sewage system.

4. There have been no new ordinances relating to public health.

5. The town has no board of health other than the town council.

6. Henry Arnold, M. D., is the health officer.

7. Gratuitous vaccination has not been provided.

8. Connecticut undertakers do not send in their returns promptly.

9. Clergymen have the habit of holding back their marriage returns at the request of the parties married.

GLOCESTER.

1. There has been no work for the promotion of public health during the past year.

2. There is no public water service.

3. There is no public sewage system.

4. There have been no new ordinances relating to sanitary affairs.

5. There is no board of health other than the town council.

6. George A. Harris, M. D., is the health officer.

7. Gratuitous vaccination has not been provided for.

8. Undertakers and clergymen are prompt in sending in their returns.

JOHNSTON.

1. There has been no work for the promotion of public health during the past year.

2. The town is supplied with water from the city of Providence. (See report of city engineer under Providence.)

3. The town has no public sewage system.

4. The sanitary ordinances have been fairly well enforced.

5. The town council is the board of health.

6. John W. Waters is the health officer.

7. The school children have been provided with free vaccination and about two hundred were vaccinated.

8. Undertakers are usually prompt in sending in their returns though some are not.

9. Clergymen are not prompt in sending in their returns of marriage.

LINCOLN.

1. There has been no work for the promotion of public health during the past year.

2. The town is supplied with water from the city of Pawtucket.

3. There are about six miles of sewers in the town of Lincoln, of which five and one-fifth miles are in Central Falls. There are about 265 sewer connections in Central Falls, with a population of about 15,000.

4. There have been no new ordinances relating to sanitary affairs passed during the past year. (Contagious disease ordinance, see report 1893, p. 63.)

5. The town council is the board of health.

6. Napoleon Malo, M. D., is the health officer.

7. Gratuitous vaccination was not provided for.

8. All of the undertakers are very slow in sending in their death returns.

9. Clergymen make the returns of marriages promptly.

NORTH PROVIDENCE.

1. There has been no work for the promotion of public health during the past year.

2. About one hundred families take Pawtuxet water at Lymansville.

3 The town has no public sewage system.

5. The town council is the board of health.

6. Sanford E. Kinnecom is the health officer.

7. Gratuitous vaccination has not been provided.

8. Some undertakers have done very well in sending in their returns, others are rather tardy.

9. Clergymen are prompt in sending in their returns of marriage.

NORTH SMITHFIELD.

1. There has been no work for the promotion of public health during the past year.

2. There is no public water service.

3. There is no public sewage system.

4. The sanitary ordinances have been fairly well enforced. (Contagious disease ordinance, see report 1893, p. 61.)

5. The town council is the board of health.

6. John B. Green is the health officer.

7. Gratuitous vaccination has not been provided for.

8 There are no undertakers in this town.

9. Clergymen are prompt in making their returns of marriages.

PAWTUCKET CITY.

SEWAGE.

A long step has been taken in the matter of disposal of the sewage of the Moshassuck drainage district. The land purchased by the city council for sewage disposal and upon which work was commenced last year, is being put into shape for proper utilization.

Filter beds are being constructed in accordance with suggestions and instructions from the best *practical* authority that we could obtain, and the work has so far progressed as to enable one to form quite a definite idea of the looks of the plant when finished, and enough to assure us of the entire success of the method.

We were aided and advised in this work by Mr. George W. Fuller, biologist and chemist in charge of the Massachusetts Experimental Station at Lawrence, and whose report on the conditions existing here before the present work was commenced is appended to this report.

It is the purpose of this department to have at least monthly analyses of the sewage and effluent made and accurate records kept of all work pertaining to the disposal of sewage at the filter fields. This we deem necessary as a matter of protection to the city for the future.

STATEMENT OF CHIEF CLERK OF WATER DEPARTMENT.

Applications for water for year ending November 30, 1894, are as follows:

In Pawtucket Division	209
In Central Falls Division	27
In Lonsdale and Valley Falls Division	63
In Ashton Division	11
In East Providence Division	65
	375

METERS.

Three hundred and seven services have been supplied with meters as follows:

In Pawtucket Division	182
In Central Falls Division	30
In Lonsdale and Valley Falls Division	41
In East Providence Division	50
In Ashton Division	4
	307
As per last year's report	4,397
Number of metered services to date	4,704

RECEIPTS FOR WATER.

For water in Pawtucket Division	$84,324 96
" " Central Falls Division	21,968 83
" " Lonsdale and Valley Falls Division	21,570 69

For water in East Providence Division	13,738 51
" " Ashton Division	885 29
Total amount received for water	$142,488 28
Amount received for stock and labor performed	11,766 05
	$154,254 33

RECAPITULATION OF RECEIPTS.

Water for public use	$124,712 82
" " hydrants, Pawtucket	9,720 00
" " " Central Falls	1,640 00
" " " Cumberland	1,860 00
" " " Watchemoket Fire District	1,260 00
" " " Prospect Hill	200 00
" " " Private	680 00
" " watering streets	300 00
" " drinking fountains	540 00
" " builders permits	707 12
" " flush basins	863 34
	$142,488 28
Balance December 1, 1893	4,206 50
	$146,694 78

SERVICES.

205 services have been made in Pawtucket Division.
38 " " " " Central Falls Division.
62 " " " " Lonsdale and Valley Falls Division.
11 " " " " Ashton Division.
71 " " " " East Providence Division.

387 total number of services put in for year in all divisions.

6,386 services in use as per last year's report.
387 additional services for year ending November 30, 1894.

6,773
79 services discontinued.

6,694 total number of services in use.

SEWERS.

There have been built during the past year 2.858 miles of sewers in the Blackstone river water shed, and 0.953 miles in the Moshassuck river district, not including the Central avenue sewer, the contract for which was completed August 1, 1891, and the West avenue sewer which was completed February 1, 1894. The two sewers above mentioned were built by contract and are the only sewers which have been built in that manner by the city. All the remaining sewers have been constructed by the city by day work.

FILTER BEDS.

In the southern part of the city on the bank of the Moshassuck river is a tract of six acres purchased for the construction of filter beds and the disposal of sewage by intermittent filtration. The construction of the sewer in Moshassuck street and the completion of the Newell avenue sewer last year together with the finishing of the West avenue sewer this year has brought a considerable quantity of sewage to these fields. Last year two settling tanks, 30 ft. by 100 ft., were built, and one of them being roofed over was used during the winter to collect the sewage. A portion of the land had been levelled off, and on this the sewage had been turned.

Upon the organization of the board of public works the engineering department was requested to furnish plans for carrying forward the work already started at these fields.

Measurements of the amount of sewage collected daily were at once begun, and examinations were made of the soil underlying the location of the beds. Under some of them a most unsatisfactory condition of things was found, the soil consisting of a bed of loam overlying a heavy bed of clay.

All this loam and clay had to be taken out to the depth of the underdrains and the space thus excavated filled with sand, a very good quality of which was found in another portion of the fields.

At the beginning of the work it was deemed advisable to consult the best authority obtainable upon this method of sewage disposal, as to the best location and size of beds, positions and depth of underdrains, quality of sand at hand with reference to the amount of sewage which it could be relied upon to purify, and also to obtain analyses of the sewage collected and of the river near the fields. Accordingly Mr. George W. Fuller, who was at that time in charge of the experimental station of the Massachusetts State Board of Health at Lawrence, Mass., where exhaustive experiments upon this method of sewage disposal have been carried on since 1888, was asked to come to Pawtucket. Mr. Fuller visited this city twice, made examinations of the various soils found upon these fields, took samples and made analysis of the sewage collected and of the river water and advised as to the best manner in which to construct filter beds at this place and the probable amount of sewage which these beds would purify.

Detailed plans were prepared by this department and in September work was begun.

Seven beds of a combined area of 1.4 acres and two sludge beds have been practically completed, the second tank has been roofed over, and this area is now ready to receive and purify the sewage which may be turned upon it.

The first bed completed and two sludge beds have been receiving the sewage of the Moshassuck river district since October 12, and though greatly overtaxed have yielded an effluent entirely colorless and without odor, and in very marked contrast to the water of the Moshassuck river into which it flows.

More work remains to be done at these beds in the completion of two more sludge beds and in the grading of some of the banks and approaches to the fields that the whole, being in close proximity to the city, may present a neat and not unattractive appearance.

Gaugings made at the settling tanks show the following average number of gallons received and cared for daily during the following months: April, average for 15 days, 35,900; May, 27,280; June, 26,390; July, 23,800; August, 25 880; September, 23,630; October, 39,770; November, 46,794.

The large amount of sewage above recorded, when compared with the small number of connections in this district, is accounted for by the fact that a large amount of ground water finds its way into some of the sewers. During the summer months the amount of sewage received was more than double the amount of water supplied to the very estates that are connected with the sewer, and this, too, in an exceptionally dry season.

Area of the city, 8.725 square miles.

Total length of streets, 122.66 miles.

Total length of water mains connected with the Pawtucket water works, 122.03 miles.

Capacity of pumping engines, 12,000,000 gallons per 24 hours.

Water pressure in Main street square, 110 lbs. per square inch.

Total length of sewers, 30.66 miles.

Total length of street railways, (electric), 19.71 miles.

REPORT OF GEORGE W. FULLER ON SEWAGE DISPOSAL AT FILTER FIELDS AT PAWTUCKET, R. I.

LAWRENCE, MASS., July 2, 1894.

MR. GEORGE A. CARPENTER,
City Engineer, Pawtucket, R. I.

DEAR SIR: I received the results of the observations made upon the new test pits and have thought over the arrangements of the beds very carefully. I enclose the sketch which I made. This will give you a general idea of the proposed changes. The elevation of surfaces of new beds should be made such that the cost of excavation and filling be a minimum. The elevations that I have given are approximate, and you can give the exact ones later on when more data will be available. I will take up the several points in order.

1st. Analysis:

When I receive small samples from the river collected with the aid of a float and as carefully as possible, I will send full results and interpretations. The main points of interest to you are as follows:

PARTS PER 100,000.

	Free Ammonia.	Albuminoid Ammonia.		Chlorine.	Oxygen Consumed.
		Total.	Insoluble.		
Sewage (average for 24 hours)..	5.3000	0.8400	0.5000	5.98	3.30
River (above Pawtucket sewage)	0.0340	0.1780	0.0580	2.12	1.40
River (below Pawtucket sewage)	0.0520	0.1760	0.0760	1.81	1.10

The total organic matter in the river below the beds is somewhat less than above. The chlorine indicates a dilution with some water *low* in chlorine, and for this reason I want small samples for confirmation, and which, if possible, shall exactly correspond with each.

The sewage for this day was somewhat stronger than the average Lawrence sewage.

2d. Settling tank.

I think one compartment will be sufficient for the sewage. This should have an overflow into the other half, which by a device such as you mentioned when I was last in Pawtucket, could be used to collect the storm water. This, after settling, could pass into the intercepting ditch below the beds and arrangements made for an overflow. The settling could be turned on to the beds when necessary. This automatic gate could possibly be put into the manhole near the tank house.

3d. Closed carriers.

These will work under a head most of the time, but the grade should be such to drain all the sewage from them after the main gate is closed. In all places pools should be avoided, as under these circumstances the sewage will putrefy and give off odors. Small brick wells could be placed at those points when laterals are put in.

4th. Open carriers at sides of beds.

These should be about one foot wide and six inches above the surface of the bed. The side next to the bed should be carefully sodded. You will find that there is a great tendency for the sewage to run under the turf at points unless care is taken. The grade is best given by a shovel after the carrier is put in use. At the lower end the bottom can be considerabiy below the level of the end.

Once in five feet an opening should be made to allow sewage to pass on to bed. Those openings can perhaps be made best after put in use. It is hard to do it before and get satisfactory results.

5th. Under-drains.

Four inch tiles will do nicely. Under the regular beds the joints should all be open and the pipe wrapped at junction with canvas or cheese cloth. When the under-drains pass below the trenches all joints within five feet of the trench should be closed tightly.

6th. Trenches.

Considerable aid in the filtration of the dilutest portion of the sewage could be gotten by putting trenches twenty-five feet apart, center to center, and three feet wide. They should be dug down until porous sand is reached and the excavation filled in with good sand. I have not data to determine grades, perhaps you will find it advisable to apply sewage from both ends. It would be well to have the sides some six inches above level of trench, and cover with boards in winter when it becomes necessary to use the trenches regularly. A six inch fall in 100 feet I believe would carry the sewage all right after a little sludge had formed on the surface near the point of application.

7th. Grading surfaces.

The surface of the regular beds should be level, except in winter, when a wide furrow should be made once in five feet (opposite opening in carrier) and extending across the bed.

8th. Sludge beds.

I planned for four long narrow beds. The bulk of the solids I believe will deposit at the end near the carrier and some of the water will pass into the ground at lower end where the surface will be clearer. A grade of six inches per 100 feet would be advisable here. There ought to at least be one foot of good sand at surface. Grades, etc., will be learned later, when amount of excavation and use of loam in other places is known.

9th. Embankments.

Over the under-drains between beds 6 and 7, 8 and 9, and 10 and 11, an embankment one foot high and one foot two inches wide should be made, to keep sewage on a single bed when desired. All embankments should contain a good loam and be seeded down to grass, as this gives a much better appearance.

10th. Intercepting ditch.

This ditch would collect the several effluents, and give an opportunity in some instances of a second filtration of considerable water before entering the brook. It would have a tendency under some circumstances of lowering the water level.

11th.

I believe the permanent capacity of this plant would be 100,000 gallons daily of ordinary sewage, provided it receives proper attention, and very possibly the lateral filtration obtained may increase the above quantity considerably. This can only be learned by actual experience. The idea should be kept in mind from the outset that sewage filters need watching in order to do good work, and an intelligent man who can keep notes faithfully should be regularly employed.

Notes on the material found in the trenches and where under-drains are laid, should be kept.

Above the under-drain the material should be free from gravel, and for two or three feet at least at the sides. The surface ought in all cases to contain at least one foot of porous sand at the surface. All clay and loam is objectionable, but I do not believe it would be wise to remove them in all places in these beds. We will let the old beds remain as they are now except carriers and under-drains.

When the beds are completed I can get a better idea of the actual porosity, and can give advice with regard to the best method of applying the sewage.

I should be glad to answer any questions Mr. Perry or you may wish to ask.

Yours very truly,

GEORGE W. FULLER.

TABLE SHOWING AMOUNT OF RAIN AND MELTED SNOW IN INCHES FOR THE YEAR ENDING NOVEMBER 30, 1894.

	DECEMBER.	JANUARY.	FEBRUARY.	MARCH.	APRIL.	MAY.	JUNE.	JULY.	AUGUST.	SEPTEMBER.	OCTOBER.	NOVEMBER.	
1	0.370	......	†0.030	......	......	......	......	*	......	......	......	......	1
2	......	......	......	*	......	*	0.130	0.740	......	......	......	......	2
3	‡1.170	......	*	......	......	......	......	......	0.540	......	*	0.560	3
4	......	......	†0.190	......	0.720	0.030	*	0.050	0.080	......	0.460	......	4
5	†1.030	0.030	......	......	......	......	0.030	......	......	......	......	‡2.300	5
6	......	†0.060	......	......	0.060	0.260	0.060	......	......	*	0.010	......	6
7	......	......	......	*	‡0.730	0.060	*	0.070	......	......	......	......	7
8	......	......	*	......	......	*	......	......	0.070	0.370	0.800	0.540	8
9	0.410	......	‡0.450	......	......	......	......	......	......	......	......	0.380	9
10	......	†0.090	......	......	......	......	......	......	......	*	1.820	......	10
11	......	0.070	......	0.010	‡2.930	*	......	......	......	......	......	......	11
12	......	......	†1.190	......	......	......	......	*	......	......	......	......	12
13	......	......	......	0.070	......	*	......	......	0.310	......	1.060	‡0.040	13
14	‡1.340	*	‡0.790	......	......	......	......	0.040	......	*	......	0.120	14
15	......	0.290	......	‡0.190	......	......	......	......	0.010	0.540	......	......	15
16	......	......	......	......	......	......	......	0.190	......	0.020	......	......	16
17	......	......	......	......	......	......	......	......	......	*	......	0.200	17
18	......	......	0.250	......	......	0.680	*	......	......	......	......	......	18
19	†0.060	0.110	0.320	*	......	......	......	......	......	2.070	......	......	19
20	......	......	......	......	......	......	......	......	0.830	......	......	......	20
21	......	......	......	0.110	0.110	......	0.150	......	......	......	......	0.320	21
22	......	......	......	0.470	......	......	......	0.280	......	......	......	......	22
23	0.040	......	......	......	......	1.090	0.030	......	......	......	......	......	23
24	......	0.370	......	......	0.060	......	......	0.080	......	......	......	......	24
25	......	......	......	‡0.020	......	......	......	......	......	......	2.490	‡0.070	25
26	......	†1.510	†0.590	......	......	*	......	......	......	......	......	......	26
27	......	......	......	......	......	......	......	......	......	......	......	*	27
28	*	......	......	......	0.070	......	*	......	......	......	......	......	28
29	0.050	‡0.960	......	‡0.320	......	1.440	*	......	......	......	......	......	29
30	†0.340	......	......	......	......	......	......	*	*	0.140	0.660	†0.120	30
31	......	......	......	......	......	1.310	......	2.295	......	......	......	......	31
	4.810	3.490	3.810	1.190	4.680	4.870	0.400	3.745	1.840	3.140	7.300	4.650	

Total rain and melted snow, 43.925.

Total depth of snow, 87.50.

* Too small to measure.

† Snow.

‡ Snow and rain.

PROVIDENCE CITY.

1. An unusual amount of work has been contemplated and executed by all the departments of the city throughout the year.

2. The account of the extension of the water service is given in the report of the department of public works appended.

3. The extension of the sewerage system has been actively carried on as will be seen by the extracts from the city engineer.

4. The removal of privy vaults in the compact portion of the city has been continued, and a plumbing law has been adopted.

5. The board of aldermen is the board of health.

6. Health officers are, Charles V. Chapin, M. D., superintendent of health; Charles H. Leonard, M. D., vaccinating physician; Eugene P. King, M. D., medical inspector; John S. Rogers, sanitary inspector; John S. Adamson, signal officer at quarantine; James T. P. Bucklin, inspector of provisions.

7. Gratuitous vaccination was continued throughout the year as usual. A large number of adults were vaccinated, and all children who desired to enter the public schools, as provided by the State laws.

8. All undertakers send in their returns of death promptly, as permits for burial or removal are required under penalty of fine and loss of license to continue business.

SUMMARY OF STATEMENTS MADE IN THE REPORT OF THE CITY ENGINEER AND COMMISSIONER OF PUBLIC WORKS.

Pollution of the Pawtuxet River.

Continued monthly inspections of the various causes of pollution of the Pawtuxet river are made, and an increased desire on the part of those polluting the stream to assist the departments has been shown.

Water Works, Hydrants, Pipes, etc.

Eighty hydrants have been set during the year.

The total number of hydrants to December 31, 1894, is sixteen hundred, including eighty in the town of Johnston. This number does not include fifty-six post hydrants in the town of Cranston.

Following is a statement of the length of each size of water pipes in the ground, December 31, 1894, considered as mains:

Sizes of Pipes.	Length in Feet.	Length in Miles.
36 inch	10,084.00	1.9098
30 "	59,912.70	11.3471
24 "	43,595.20	8.2567
20 "	9,626.59	1.8232
16 "	33,067.60	6.2628
12 "	80,854.77	15.3134
10 "	14,657.41	2.7760
8 "	240,354.26	45.5216
6 "	1,011,382.03	191.5496
Totals	1,503,534.56	284.7603

Included in the above table are the following approximate lengths of pipes which are laid in adjoining towns:

Cranston.		Johnston.		North Providence.		Pawtucket.		Warwick.	
Sizes of Pipes.	Length in Miles.	Sizes of Pipes.	Length in Miles.	Sizes of Pipes.	Length in Miles.	Sizes of Pipes.	Length in Miles.	Sizes of Pipes.	Length in Miles.
36-inch.	1.9098	30-inch.	0.0587	30-inch.	0.0037	12-inch.	0.0003	6-inch.	0.3398
30 "	4.5134	12 "	0.0451	24 "	0.5386				
24 "	0.1307	8 "	6.7218	12 "	0.0154				
12 "	1.8791	6 "	8.7969	8 "	0.5011				
8 "	5.4050			6 "	0.3998				
6 "	14.2524								

Total length of pipes laid in adjoining towns, 45.5116 miles.

The approximate cost of laying water pipes, with appurtenances, except hydrants, and including iron at $30 per long ton, is:

For 4-inch	$0.498	per foot.
" 6 "	0.725	" "
" 8 "	0.973	" "
" 10 "	1.244	" "
" 12 "	1.593	" "
" 16 "	2.403	" "
" 20 "	3.359	" "
" 24 "	4.454	" "
" 30 "	6.348	" "
" 36 "	8.540	" "

The number of meters in use is 13,153.

The number of service pipes in use is 18,152.

The average daily use of water per service for the year 1894 has been 546 gallons.

The population of the city is estimated at 153,000, and the population supplied in the suburbs is estimated at 11,200.

The water receipts for 1894 were $432,384.

The cost of maintenance for 1894 was $103,297.

The cost of the water works construction from November 8, 1869, to January 1, 1895, is $6,067,017.17, upon which there has been a revenue for water sold of $6,406,577.02.

The monthly and annual and the average daily and monthly consumption of water, including waste and leakage, during the year is shown by the following table:

Months.	Consumption per month.	Average monthly consumption.	Average daily consumption per month.	Average daily consumption for the year.
January	282,331,421		9,107,465	
February	253,892,621		9,067,594	
March	281,769,999		9,089,355	
April	261,810,181		8,727,006	
May	309,118,483		9,971,564	
June	338,424,523		11,280,817	
July	384,231,481		12,394,564	
August	333,526,201		10,758,910	
September	306,530,493		10,217,683	
October	316,199,380		10,199,980	
November	265,941,994		8,864,733	
December	281,341,738		9,075,540	
Total	3,615,118,515			
Averages		301,259,876		9,904,434

The amount of water consumed, shown in the above table, includes the supplying of about thirty-eight and four-tenths miles of distribution pipes, located in adjoining towns, as well as supplying the greater part of the State Institutions at Cranston. A considerable quantity of water has been used during the year for irrigating at the Dexter Asylum, and also upon the improved sewerage system. Also, in the colder months, a large quantity of water has been run from the distribution pipes through small blow-offs at different points where the pipes are not sufficiently protected in crossing bridges and elsewhere, for increasing the circulation in order to prevent the water from freezing in the pipes.

The quantity of water supplied to the city and suburbs by the Providence water works has been during the past year greater than ever before, and the annual increase has been rapid. The average daily consumption, as shown above, was 9,904,434 gallons. From the fifth of last July to the second of last August (twenty-five days not including Sundays) the average daily consumption of water was 13 316,000 gallons, and from July ninth to July twenty-first (twelve days not including Sunday) the average daily consumption of water was 14,017,000 gallons. The maximum consumption of water for any one day was 16,353,000 gallons.

The erection at the Pettaconset pumping station, of the new Worthington vertical triple-expansion engine of fifteen million gallons capacity per twenty-four hours, which was contracted for last year, was commenced in April of the present year. This engine is not yet completed, but will probably be ready for the trial test specified in the contract about the first of next March.

Suggestions were furnished by this department for plans, made elsewhere, of a Morrison-Jewell filter plant suited to the use of the city.

A plan for supplying Warwick Neck with water has been made, and surveys relative to the pollution of the Pawtuxet river have been made. Cross sections of land at Pettaconset pumping station have been made relative to the location of a natural filter plant. A natural filter plant has been designed, and much other work of a miscellaneous nature has been done by this department.

On Eddy street, at different intervals from August 6th to August 22d, 1894, while a sewer was in course of construction, about twenty-four feet of thirty-inch cast iron water pipes, about four hundred feet of six-inch cast iron water pipes, five lead service pipes, about twenty-four feet of sixteen-inch cast iron gas pipes, and several lengths of four-inch cast iron gas pipes, which had been removed from the trench, were examined for electrolysis. There were no signs of electrolysis discovered during a careful examination of the above mentioned pipes. When the examinations were made the electric trolley cars had been running in Eddy street about seven months. The earth above the pipes was of a dry, sandy, pervious nature. The pipes examined extended from in front of the electric power house southerly. The electric cars ran between and over the thirty, sixteen, four and six inch pipes for about two hundred feet, the other six pipes examined being in front of the power house and leading from the same to the pipes between and over which the cars ran.

Filtration Experiments.

The filtration experiments, which were in progress at the end of last year, were completed the latter part of January. A full report giving the results obtained during the experiments and describing in detail the manner in which they were conducted was made in February last by Mr. Weston, assistant engineer, under whose special direction the experiments were conducted.

The experimental filters were thirty inches in diameter; upon these the best results were obtained with the Morrison mechanical filter, by using basic sulphate of alumina at the rate of six-tenths (0.6) of a grain per gallon of applied water, while filtering at the rate of from 90,000,000 to 193,000,000 gallons per acre per twenty-four hours.

The result of an analysis of the basic sulphate of alumina used, which was made by Professor Thomas M. Drown of the Massachusetts Institute of Technology, is as follows:

One-half ($\frac{1}{2}$) grain of sulphate of alumina contains

Insoluble residue	0.52 per cent.	.0026 grains.
Alumina (Al_2O_3)	15.78 "	.0789 "
Sulphuric acid (SO_3)	36.79 "	.1840 "
Water by difference	46.91 "	.2345 "
	100. "	.5000 "

The following is a brief summary of the results obtained with the Morrison mechanical filter while filtering at an average rate of 128,000,000 gallons per acre per twenty-four hours, when six-tenths (0.6) of a grain of sulphate of alumina was being used per gallon of applied water, viz.:

Water bacteria removed	98.6 per cent.
Applied "Bacillus Prodigiosus" removed	99.8 "
Albuminoid ammonia removed	70.0 "
Ready-formed ammonia removed	91.0 "
Color removed (during the day)	78.0 "
Color removed (during the night)	66.0 "
Per cent. of the total amount of water filtered during a run, necessary to wash the filter bed	4.9 "
Per cent. of the total amount of water filtered during a run, necessary to waste after starting the filter	2.9 "

Making a total waste of 7.8 per cent.

The average length of run of the filter was sixteen and seven-tenths hours for a rise in height of four feet of water after the filter commenced to discharge at an average rate of 128,000,000 gallons per acre, per twenty-four hours.

The records relating to meteorological observations have been kept by this department.*

The following is a statement of the total lengths of each size of regular sewers constructed to January, 1895:

SIZE.	Constructed previous to 1894.	Constructed in 1894.	Totals.
Total length in feet	598,822.77	53,303.90	652,126.67
" " " miles	113.4134	10.0954	123.5088

An inspection of the preceding tables will show that 10.095 miles of regular sewers have been built during the year 1894, of which 8.115 miles were of pipe and 1.98 miles were of brick, making the total length to date 93.161 miles of pipe and 30.348 miles of brick sewer.

Under the appropriation for improved sewerage, 2.988 miles of sewers have been built, which added to the 10.095 miles of regular sewers, makes a total of 13.083 miles of sewers built the past year, and a total of 141.747 miles of sewers in the sewerage system.

Five hundred and eighty feet of sewer for taking storm water only has been built on Promenade street, and 793.79 feet of 20-inch brick sewers on Elmwood avenue and Burnett street have been discontinued, leaving a total of 3.592 miles of such sewers in use January 1, 1895.

The number of house connections made in 1894 was 1,146, making the total number connected to date 10,587.

Under authority given to the commissioner of public works by an act of the legislature, passed the 12th day of June, 1894, 6-inch pipe drains have been laid from the sewer to the curb line on all sewers constructed since that date.

* See meteorological data at end of report.

Two and four hundred and forty-one thousandths miles of such drains have been laid, and the result expected, by preventing the tearing up of the surface for drain laying after the street is constructed, is a great improvement in the condition of the streets both in appearance and use, as well as a saving in the cost of maintenance. The cost of these drains is assessed upon the abutting property and paid with the sewer assessments.

With the view of ascertaining what well made sewer pipes of different makes could stand as crushing weight, and in order to keep the standard as high as possible, it has been the practice to occasionally test the brands of pipe, being used at the time, by the crushing test. These tests have been made at the city pipe yard. The accompanying plate shows the method of operation fairly well. The pipe is buried about three-fourths of its diameter in fine sand, just moist enough to ram compactly, and is made level longitudinally; on top is placed a piece of hard pine timber 4-inch x 8-inch x 4 feet long, with a strip of ¼-inch rubber between it and the pipe. Fastened to the top surface of this block, so as to be over the centre of the pipe, is a long piece of narrow half round iron, upon which rests the ends of two 6-inch x 6-inch timber skids about twelve feet long, the other end of the skids resting on another piece of half round iron on solid blocking, the irons being just ten feet apart and level with each other. Between the two the skids are marked on their sides into feet and decimals; a run is made, upon which are rolled some 36-inch cast iron water pipe, they getting the first bearing upon the skids when exactly over the half round iron at the fulcrum end. As the pipe is rolled slowly and steadily along, the exact distance from the fulcrum end is noted when the sewer pipe gives way. To prevent the iron pipe from rolling off when this occurs, two blocks are placed, one at each end of the sewer pipe, and about one-half an inch clear from and beneath the block resting on the pipe. In the illustration the nearer block has been moved back so as to show the end of the pipe as buried. These tests have covered upward of 140 pieces of pipe, of eight, twelve, fifteen and eighteen inches in diameter, and from twelve to thirteen makers.

The tests range as follows:

For	8-inch pipe,	from	1,363	to	2,356	lbs. per foot length of pipe.
"	12 " "	"	1,227	"	2,756	" " " " " "
"	15 " "	"	1,261	"	2,297	" " " " " "
"	18 " "	"	1,464	"	2,093	" " " " " "

The above amounts are averages of from two to seven tests made at the same time. The lowest and highest breaking weights are as follows:

For	8-inch pipe—lowest	757,	highest	2,498.
"	12 " " "	924,	"	2,816.
"	15 " " "	1,063,	"	2,666.
"	18 " " "	1,305,	"	2,401.

Most of these pipes were taken from stock and were of the standard thickness in use at the time by the maker. The thickness varies with different makers and sometimes with the same maker at different times.

Tests have also been made of the comparative qualities of pipes as shown when cutting them in different ways.

Some sixty-six tests have been made of pipes from four to eighteen inches in diameter, by breaking them with hydraulic pressure. The highest pressures attained were as follows:

For	18-inch	pipe,	in	6	samples,	65	pounds	per	square	inch.
"	15	"	"	"	7	"	174	"	"	"	"
"	12	"	"	"	14	"	138	"	"	"	"
"	10	"	"	"	5	"	78	"	"	"	"
"	8	"	"	"	8	"	214	"	"	"	"
"	6	"	"	"	14	"	213	"	"	"	"
"	5	"	"	"	5	"	225	"	"	"	"
"	4	"	"	"	7	"	165	"	"	"	"

SCITUATE.

1. There has been no work for the promotion of public health during the past year.
2. There is no public water service.
3. There is no public sewage system.
4. There have been no new ordinances relating to sanitary affairs passed.
5. The town council is the board of health.
6. Dr. S. B. Smith is the health officer.
7. Gratuitous vaccination has not been provided for.
9. Clergymen are generally prompt in sending in their returns of marriages.

SMITHFIELD.

1. There has been no work for the promotion of public health during the past year.
2. There is no public water service.
3. There is no public sewage system.
4. The following was passed October 27, 1894:

Concerning Nuisances, Etc.

SECTION 1. No person shall keep any hog or hogs in said town, unless the same are kept in such manner that the inhabitants of the neighborhood are not annoyed by the odor arising therefrom.

SEC. 2. No person shall suffer his or her fowls, of any kind, to go at large off his or her premises in said town.

Any person who shall violate the provisions of this or the preceding section shall be fined not less than two dollars nor more than twenty dollars for each and every offence.

SEC. 3. Any person who shall remove or in any way carry the contents of any sink, cesspool or privy, in or through any public highway, between the first day of June and the first day of October in each year, after sunrise in the morning and before sunset in the evening, or any person who shall at any time

remove or carry the contents of any sink, cesspool or privy in or through any public highway, in any cart, wagon, or vessel whatever, unless the same is so constructed as not to scatter or leak the contents, shall be fined not less than three dollars nor more than five dollars.

SEC. 4. Any person who shall have any horse, ox, mule, cow, bull, sheep, dog, or any large animal die in said town, or who shall bring or cause to be brought into said town, the dead body of either of the aforenamed animals, shall bury or cause to be buried, the same, within twenty-four hours after the death of such animals, so that every part of the same shall be at least three feet below the surface of the ground where the same shall be buried. Any person who shall violate the provisions of this section shall be fined not less than five dollars nor more than twenty dollars.

Concerning the Board of Health.

SECTION 1. It shall be the duty of every health officer of this town to examine into the state and condition of every place and part of said town where where such officers shall suspect or be informed that there exists any matter or thing which is or may become injurious to the health of the inhabitants thereof.

SEC. 2. Whenever it shall appear to the satisfaction of any health officer that there exists upon any premises owned or occupied by any person or persons, any filth or offal, or any animal or vegetable matter, or the contents of any hog-pen, cow-yard, barn, privy, drain, cesspool or vaults, injurious to health or the neighborhood, it shall be the duty of such health officer to cause the owner or occupant of such premises to be notified in writing of the existence of such nuisance or annoyance, and to direct such owners or occupants forthwith to remove or abate the same; and if such nuisance or annoyance shall not be abated within twenty-four hours after such notice shall have been received, such owner or owners, occupant or occupants, shall, for each and every day they shall suffer such nuisance or annoyance to remain after the notice aforesaid, be sentenced to pay a fine of not less than five dollars nor more than twenty dollars.

SEC. 3. If such nuisance or annoyance shall not be abated by the owners or occupants of the premises where such nuisance or annoyance exists, at or before the expiration of the notice mentioned in the next preceding section of this ordinance, and if in the opinion of such health officer the expenses of abating the same will not exceed the sum of ten dollars, then it shall be the duty of such health officer to authorize in writing the sheriff of this county, his deputies, or the town sergeant or either of the constables or police constables of this town, forthwith to cause such nuisance or annoyance to be abated. And the town council shall order the expenses thereof, not exceeding ten dollars, to be paid out of the town treasury of said town to the officer abating the same, which said expenses, so paid as aforesaid, shall be recovered from the party causing or continuing said nuisance or annoyance, in an action of debt in the name of the town treasurer of said town, before any court of competent jurisdiction.

Rules of the Board of Health for the Prevention of the Spread of Contagious Diseases.

SECTION 1. Every physician having knowledge of the existence of any cases of contagious, infectious, or epidemic disease within the town of Smithfield, shall immediately make a report thereof in writing to the health officer of said town, with such particulars as the said officer may indicate on blanks furnished for that purpose.

SEC. 2. The diseases referred to in the preceding section shall include cholera, yellow fever, typhoid fever, typhus fever, cerebro spinal-meningitis, diphtheria, small-pox, scarlet fever and such other contagious, infectious, or epidemic diseases as the health officer may from time to time direct.

SEC. 3. Any physician who shall fail to comply with the preceding regulations, shall be fined not less than two dollars, nor more than ten dollars, for each day of such neglect, after having knowledge thereof as aforesaid.

SEC. 4. No person living in a family where there is a case of small-pox, shall attend school until the patient shall have passed the period of desiccation (falling off of scabs), and until the house has been properly fumigated.

SEC. 5. No person living in a family where there is a case of scarlet fever, shall attend school until five weeks from the beginning of the last case, and until the house has been properly fumigated.

SEC. 6. No person living in a family where there is a case of diphtheria, shall attend school until one week after the recovery of the patient, and until the house has been properly fumigated.

SEC. 7. The above rules shall, when deemed necessary by the health officer, be extended to all persons living in the same house where the above diseases exist; and, when they deem it necessary, the board may extend the period of isolation specified in the foregoing sections.

SEC. 8. A certificate from the health officer, stating that the required time has elapsed and that the fumigation has been properly performed, will be required by the teacher before the persons referred to in the foregoing sections can be admitted to school.

SEC. 9. No persons with measles, whooping-cough, mumps or chicken-pox, shall attend school until after complete recovery.

SEC. 10. Whenever there is a case of scarlet-fever or diphtheria in any house, the health officer shall cause to be placed upon such house a card bearing the name of the disease there existing; and such card shall not be removed except by permission of the board of health.

SEC. 11. The funeral of any person who has died of small-pox, diphtheria, scarlet fever, typhus fever or Asiatic cholera, shall be private; and no person having the care or custody of the body of any person who has died of the above diseases, shall do, or knowingly or wilfully permit to be done, any unnecessary act by which the spread of disease from such dead body may be caused or promoted.

SEC. 12. Any person who shall violate any provision of the next preceding rule, shall, upon conviction thereof, be fined not more than twenty dollars or be imprisoned not exceeding ten days; and any undertaker who shall violate any provision of said rule, upon conviction thereof, shall, in addition to the

above penalty, be thereupon and thereby removed from the office of undertaker.

5. The town council is the board of health.

6. Jenckes Smith is the health officer.

7. Gratuitous vaccination has not been provided for.

8. Undertakers and clergymen are prompt in sending in their returns.

WOONSOCKET CITY

1. Work on sewers has been ordered but as yet nothing has been done, but work will be commenced as soon as the ground is ready.

2. The following extracts from the report of the water department will give the answer in reference to the water supply:

In accordance with the city ordinance of November 16, 1893, surveys have been made for an increased water supply, resulting in the location of a storage reservoir on the Crook Fall Brook (the present source of supply) about two and one-half miles above the present reservoir; this will be of sufficient capacity to supply the city for many years. A detailed description of the engineering features of this reservoir will be found in the report of the Superintendent attached herewith.

As the ordinance authorized your commissioners to purchase the necessary lands for this work, we entered into negotiation with the land owners, resulting in the purchase of 294.5 acres on very satisfactory terms to the city.

In two cases more land was purchased than was required for the purposes of the reservoir, as by so doing claims for damage to buildings and valuable rights of way across the reservoir site were wiped out, and a convenient and comfortable house was secured for the ultimate use of the man to be put in charge of the reservoir. The owners of 107.6 acres of land absolutely necessary for the reservoir set exorbitant figures on their property, and having refused to settle on reasonable terms it was condemned as shown in the report of the condemnation commission appointed by the city council.

With the approval of the city council your commissioners propose to begin the construction of the dam for the reservoir as early as practicable in the spring; detailed plans have been made of same, copies of which will be found in the report of the superintendent. On the basis of the engineer's estimates an appropriation of $50,000 will be necessary to complete this work, which will make the net cost of our water works complete $536,949.80, less $18,348.11 meter deposits and material sold which has been charged to the department.

Our net surplus this year of $21,000 is much less than it would have been under favorable conditions. The hard times, shortage of water, and unsatisfactory condition of the same during the summer reducing the consumption materially.

Although the summer of 1893 was a very dry one, the summer of 1894 was much more so, the dry season extending through September, a month when usually there is much rainfall. Our water supply was nearly exhausted and would have been entirely so, had not the consumption been materially lessened

by stopping the use of water on the streets, lawns, and in other ways. The upper reservoir was drawn dry, and that remaining in the lower reservoir became stagnant and unfit for domestic use. As soon as the rainfall would warrant, this was entirely drawn off and the water is now in a very satisfactory condition as shown by the analysis made by the state board of health attached hereto.

We consider it advisable that the city control the land bordering on its water supply, as far as practicable, and we would recommend that the board of water commissioners be authorized to purchase any lands contiguous to Crook Fall Brook or its tributaries when in their judgment it is expedient.

The actual cash receipts for the year show a gain of $1,381.39, and the credited a gain of $347.38, making a total gain of $1,728.77. You will observe that the actual cash receipts of the department $31,762.11, is sufficient to pay the interest on the net cost of the works, the management and repairs, and leaves a balance of $4,347.61. You will also observe that the actual cash receipts of the department pay the interest of 4 per cent. on the total cost $555,559.95, and its management and repairs within $152.64.

There is deposited with the city treasurer for the year ending November 30, 1893, meter deposits and monies received for materal sold, to the amount of $18,135.51. The department receives no credit for this money; if it had received credit for this year for that amount at 4 per cent., this additional amount of $725.42 would leave a balance of $572.78 to the credit of the department. This shows that the water works is a paying investment, and that the city receives hydrant rental, water for street watering, fountains, and public buildings, free of expense. This must be gratifying to the taxpayers, for after ten years of ownership, the water works is a source of revenue to the city.

A large amount of pipe has been laid by the department during the past season. I have prepared a table showing the amount laid on each street, the size, total cost, cost per foot, and the per cent. of revenue received on cost, based on six months' receipts. I think upon investigation you will find the cost per foot is low, when compared with other cities, the pipe being covered five feet. Particular attention has been paid this year to the back filling of the trenches, care being taken to leave the street in as good a condition as possible. Macadamized streets have been carefully rolled, the material being sorted, and replaced as near as possible in its original position.

During the month of September advantage was taken of the low state of the Blackstone, and a 12-inch main was laid in the river bottom, off Cumberland street; this main can now be connected with the 12-inch at the River Spinning Mill, and continued to the junction of Rathbun and Social streets. The water in the river being low a coffer dam was not required to lay the pipe, a saving to the department of at least $500. As this main has been recommended for some time, I think it advisable to complete the work as early as possible next season.

The most important work of the year has been the survey of the water shed of Crook Fall Brook, and the location of the proposed storage basin. The latter part of December surveys were commenced, and continued through the winter months, under the direction of your superintendent, assisted by Fred A. Caldwell, C. E.

The water shed of the proposed basin was first surveyed, and comprised an area of 1,944 acres. The section of country drained is unpolluted, it is quite extensively wooded, a portion being swamp land.

The proposed basin is situated south-east of Sayles hill, so-called, and between the Georgiaville and Rocky hill roads. The basin will cover an area of 197 acres, with an average depth of about nine feet, and will have a storage capacity of 529,000,000 gallons. The proposed dam is so designed that when additional storage is required an addition of six feet will increase its area to 240 acres with a capacity of 875,000,000 gallons, the estimated yield of the water shed. Sufficient land has been purchased and condemned, to allow flowing the basin to its full capacity, and complete control of its shores.

Your recommendation that the water commissioners have authority to purchase any and such lands as in their judgment may be deemed necessary, to improve and protect the city water supply, is worthy of consideration.

The water shed of Crook Fall Brook comprises an area of 7.9 square miles, and an estimated population of 73. The area drained is mostly wood, meadow and a large area of swamp land. The country is hilly, and from its source to the Blackstone river, a distance of six miles, it falls about 300 feet. Investigations for available site for storage basin have not so far progressed as to determine the limit of its capacity, but it is safe to say that Crook Fall Brook will supply Woonsocket at its present rate of growth for a considerable length of time.

The proposed dam is situated about 200 feet west of the Georgiaville road, and in the towns of Smithfield and North Smithfield, and will be constructed of earth with a core of part concrete and sheet piling. A masonry spillway of granite will be constructed in dam, twenty-five feet wide.

Two lines of 20-inch pipe will be laid through dam for drawing off purposes. A gate house of wood, 12 x 15 feet, will be constructed for necessary appliances for raising and lowering gates.

As I have noted before the dam is so designed that when additional storage is required six feet can be added to its height. Annexed to this report are sketches of the proposed dam, to which I refer for a more particular description.

During the latter part of August a disagreeable odor and taste was noticed in the water; this was due to the use of the lower intake at the pumping station, the water in the reservoir being so low that the upper intake could not be used. Many people supposed that the trouble was due to the condition of the reservoir, and if cleaned the trouble would not occur. The reservoirs are in good condition, the cause for trouble is not in the reservoirs, for the water is impregnated with vegetable matter before it reaches the reservoirs.

The only way to improve the city water is by filtration. With a plentiful supply, as the case will be when the new reservoir is completed, the water in reservoir No. 1 can be kept in constant circulation through the discharge pipe under the dam. The past season no water was wasted after the 26th of May, and to that alone was due the poor condition of the water.

The pumping station and contents are in good condition. The Deane pump has been used most during the year. Some grading has been done about the

station, which adds to its appearance; the general appearance and neatness of the station is due to your efficient engineer.

I again call your attention to the tenement occupied by the engineer, the rooms are small, and your engineer deserves better accommodations. I hope during the coming year an effort will be made to provide a different tenement.

In conclusion, I wish to express my thanks to my several assistants for the able manner in which they have performed their work, and to your honorable board for your assistance in carrying out the work of the department.

Respectfully submitted,

BYRON I. COOK, *Superintendent.*

SUMMARY OF STATISTICS.

Woonsocket Water Works Department.

City of Woonsocket, County of Providence, State of Rhode Island.

	Population, 1894	25,000.
	Date of construction	1884.
	Source of supply	Crook Fall Brook.
	Mode of supply	Pump to tank.
1.	Builders of pumping machinery	Henry R. Worthington. Deane Steam Pump Co.
2.	Description of coal used	*a.* Bituminous coal. *b.* Amer. Coal Co.'s & Pocahontas. *c.* \$4.35 per ton. *d.* 7.66 per cent. Ash. *e.* Wood, \$3.00 per cord.
3.	Coal consumed for the year	784,159 lbs.
4.	Pounds wood consumed for the year, 309÷3	103 lbs.
5.	Total fuel consumed for the year, 3+4	784,262 lbs.
6.	Total pumpage for the year in gallons	206 765,840 gal.
7.	Average static head against which pump works	239,156 feet.
8.	Average dynamic head against which pump works	240,302 feet.
9.	Number gallons pumped per pound of coal (3)	262 gals.
10.	Duty $\left\{\dfrac{\text{Gallons pumped (6) x 8.34 lbs. x 100 x dynamic head (8).}}{\text{Total fuel consumed (5) no allowance.}}\right\}$	52,966,254.
	Cost of pumping figured on pumping station expenses, viz:—\$3,343.08.	
11.	Per million gallons raised against (dynamic) head into tanks	\$16.65.
12.	Per million gallons raised one foot high (dynamic)	.069.
	Cost of pumping figured on total maintenance, viz:—\$27,414 50.	
13.	Per million gallons raised against (dynamic) head into tanks	\$132.58.
14.	Per million gallons raised one foot high (dynamic)	.55.
15.	Range of pressure on mains at centre of the city	90 to 115 lbs.

Consumption.

1.	Estimated total population	25,000.
2.	Estimated population on lines of pipe to date	23,000.
3.	Estimated population supplied to date	20,000.
4.	Total gallons consumed for the year	205,086,916.

5. Average daily consumption in gallons..................................563,368.
6. Gallons per day to each inhabitant..................................22.53.
7. Gallons per day to each consumer..................................26.15.
8. Gallons per day to each tap..................................325.

PUMPING STATION.

Boilers.

1. Type, horizontal tubular; number of boiler, three; size of two, 4 feet 6 inches x 14 feet; size of one, 76 inches x 16 feet 2 inches.
2. Grate area..................................50.5 square feet.
3. Steam pressure carried..................................66.04 lbs.
4. Average temperature of feed water..................................140.75 degrees.

Pumps.

5. Type—One Worthington, compound, duplex, direct acting, with independent condenser. Capacity—One million gallons in 24 hours.
6. Type—One Worthington, high pressure, duplex, direct acting, with independent condenser. Capacity—One million gallons in 24 hours.
7. Type—One Deane, compound, duplex, direct acting, with independent condenser. Capacity—Two and one-half million gallons in 24 hours.
8. Capacity per revolution, as used in calculating duty........70.00 gallons.
9. Static head on pump (Deane)..................................239,156 feet.
10. Dynamic head on pump (Deane)..................................240,302 feet.
11. Number of days pumping..................................229 days.
12. Total pumping in hours..................................2,002.25 hours.
13. Average pumping time per day..................................8.74 hours.
14. Average number of gallons pumped per day's run..........902,927 gals.
15. Total pumping station expenses not including fuel.............$1,665.58.

Monthly Consumption.

Month.	Ave'ge Consumption. 6 A. M. to 6 P. M.	Ave'ge Consumption. 6 P. M. to 6 A. M.	Total Average Daily Consumption.	Total Consumption for Month.
December........	160,950	360,832	521,737	15,652,124
January	163,947	337,658	501,606	15,549,781
February........	171,830	393,675	565,505	15,834,158
March...........	166,435	378,763	545,198	16,901,135
April...........	160,378	399,051	559,429	16,782,878
May.............	163,372	467,041	630,413	19,542,822
June............	187,808	498,522	686,330	20,589,898
July............	207,276	499,240	706,516	21,902,008
August..........	160,310	397,573	557,883	17,294,380
September.......	154,048	382,086	536,116	16,083,470
October.........	124,573	338,045	463,518	14,369,054
November.......	136,639	349,534	486,173	14,585,208
Total.........	1,957,566	4,802,920	6,760,424	205,086,916
Averages......	163,130	400,243	563,368	17,090,576

Rainfall at Pumping Station.

December	4.27 inches.
January	3.62 "
February	4.82 "
March	1.36 "
April	4.55 "
May	5.25 "
June	0.77 "
July	1.85 "
August	1.99 "
September	2.07 "
October	6.46 "
November	3.77 "
Total	40.78 "

ANALYSIS OF WATER,

Taken from Service No. 906, Main Street.

CHEMICAL.

Laboratory Number.	DATE OF		APPEARANCE.			ODOR.		RESIDUE ON EVAPORATION.			AMMONIA.				Chlorine.	Nitrogen as Nitrates.	Nitrogen as Nitrites.	Hardness.	Iron.
												Albuminoid.							
	Collection.	Examination.	Turbidity.	Sediment.	Color.	Cold.	Hot.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.					
100	Oct. 15, 3.15 P. M.	Oct. 16, A. M.	None.	Slight Brownish.	.75	None.	Very Slight.	7.2	1.5	5.7	.000	.02	.0189	.0011	.7	Trace.	.00	.99	.05

(Signed) GEORGE F. PERKINS, *Analyst.*

BACTERIOLOGICAL.

Laboratory Number.	BACTERIA.		
	Number of Colonies.	Number of Species.	Number of Liquefying Colonies.
74 October 15	539	6 x	118
	43 hours growth.		

(Signed) GARDNER T. SWARTS, *Analyst.*

8

6. Dr. Ara M. Paine, James C. Moulton and Joseph Jalbert constitute the board of health.

7. Gratuitous vaccination has not been provided for during the past year.

8. Undertakers have been prompt in sending in their returns.

9. Clergymen are not prompt in sending in their returns.

WASHINGTON COUNTY.

CHARLESTOWN.

1. There has been no work for the promotion of public health during the past year.

2. There is no public water service.

3. There is no public sewage system.

4. There have been no new ordinances for sanitary purposes, but all old ones have been well enforced.

5. The town council is the board of health.

6. H. L. Stillman, M. D., is the health officer.

7. Gratuitous vaccination has not been provided for.

8. Undertakers have quite promptly sent in their returns of death.

9. Clergymen have made returns very promptly.

EXETER.

1. There has been no work for the promotion of public health during the past year.

2. There is no public water service.

3. There is no public sewage system.

4. There have been no new ordinances relating to sanitary matters passed.

5. The town council is the board of health.

6. There is no health officer.

7. Gratuitous vaccination has not been provided for.

8. Undertakers are fairly prompt in sending in their returns of death.

9. Clergymen are not always prompt in sending in their marriage returns.

HOPKINTON.

1. An ordinance concerning contagious, infectious, or epidemic diseases was adopted September 1, 1894.

2. There is no public water service.

3. There is no public sewage system.

4. The following was passed September 1, 1894:

TOWN OF HOPKINTON.

An Ordinance Concerning Contagious, Infectious or Epidemic Diseases.

It is Ordained by the Town Council of the Town of Hopkinton, as follows:

Section 1. Every physician having knowledge of the existence of any case of contagious, infectious or epidemic disease within the town of Hopkinton, shall immediately make report thereof in writing to the health officer of said town, with such particulars as the said health officer may indicate on blanks furnished for that purpose, and said health officer shall without delay cause to be placed upon such house or place, a card bearing the name of such disease, which card shall not be removed except by permission of such health officer.

Sec. 2. The diseases referred to in the preceding section shall include cholera, yellow fever, typhus fever, typhoid fever, cerebro spinal meningitis, diphtheria, small-pox, scarlet fever and measles and such other contagious, infectious and epidemic diseases as the town council may from time to time direct.

Sec. 3. Any physician who shall fail to comply with the two next preceding sections, shall be fined not less than two, nor more than ten dollars for each day of such neglect, after having knowledge thereof as aforesaid.

Sec. 4. No person living in a family where there is a case of small-pox, shall attend school until the patient shall have passed the period of desiccation (falling off of scabs), and until the house has been properly fumigated.

Sec. 5. No person living in a family where there is a case of scarlet fever, shall attend school until five weeks from the beginning of the last case, and until the house has been properly fumigated.

Sec. 6. No person living in a family where there is a case of diphtheria, shall attend school until one week after the recovery of the patient, and until the house has been properly fumigated.

Sec. 7. No person living in a family where there is a case of measles, shall attend school until one week after recovery, and until dequamation (peeling off of the skin) shall have ceased.

Sec. 8. No person with whooping-cough, mumps or chicken-pox, shall attend school until complete recovery.

Sec. 9. The five preceding sections shall, when deemed necessary by the health officer, be extended to all persons living in the same house where the above diseases exist; and when deemed necessary, the health officer may extend the period of isolation specified in same sections.

Sec. 10. A certificate from the health officer, stating that the required time has elapsed and that fumigation has been properly performed, will be required by the teacher, before the person referred to in the fourth, fifth and sixth sections of this ordinance can be admitted to school.

Sec. 11. No undertaker shall conduct or allow to be conducted, public funeral ceremonies over the body of any person dying of any disease enumerated in section two of this ordinance, without special permission from the health officer or town council, and any undertaker violating the provisions of this section shall be fined ten dollars for each offence.

Sec. 12. The body of every human being buried within the municipal limits of this town, shall be so buried that the top of the coffin or receptacle containing said body, shall be at least three feet below the usual surface of the ground where buried. Whoever buries or inters a body at a less depth, without special permission from the town council, shall be fined ten dollars for every such offence.

Sec. 13. In all cases where default shall be made in the payment of the fine and costs imposed by the court, for violation of this ordinance, each and every person upon whom such fine and costs shall be imposed, shall be committed to the Washington County jail, until sentence be performed in all its parts.

Sec. 14. It shall be the duty of the health officer to complain of and prosecute to final judgment all violations of this ordinance, and he shall be entitled to one-half of all the fines recovered by virtue hereof, and the other half he shall pay into the town treasury.

Sec. 15. This ordinance shall go into operation and effect September 1st, A. D. 1894. A true copy.

Attest: E. R. Allen, *Council Clerk.*

G. A. Langworthy, *Health Officer*, Canonchet, R. I.

5. The town council is the board of health.

6. George A. Langworthy is the health officer.

7. Gratuitous vaccination has not been provided.

8. Undertakers and clergymen are prompt in sending in their returns

NARRAGANSETT.

1. There has been no work for the promotion of public health during the past year.

2. About one-tenth of the resident population is supplied with water from the Wakefield Water Co.

3. The District of Narragansett has a sewage system of about 12,000 feet in aggregate length, and about ten per cent. of the resident population are connected therewith.

5. The district council is the board of health.

6. Lewis A. Champlin is the health officer.

7. Gratuitous vaccination has not been provided for during the past year.

8. Undertakers and clergymen are not prompt in sending in their returns.

NORTH KINGSTOWN.

1. There has been no special work for the promotion of public health during the past year.

2. There has been no introduction or extension of the water service for general use.

3. There is no public sewage system.

4. No new ordinances have been enacted since 1886.

5. The town council is the board of health.

6. Lance de Jongh is the health officer.

7. Gratuitous vaccination has not been provided for.

8. Undertakers and clergymen have made prompt returns this year.

RICHMOND.

1. There has been no work for the promotion of public health during the past year.

2. There has been no introduction of water service.

3. There is no public sewage system.

An Ordinance in Relation to the Prevention and Spreading of Contagious Diseases.

November 23, 1893.

It is ordained by the Town Council of the Town of Richmond, as follows:

Section 1. Any person who shall, without the permission of the town council, remove, destroy, obliterate, or deface wholly or in part any printed or written notice or sign, which shall have been posted, set up, or displayed to indicate the existence of any contagious or infectious disease, on any house or premises, shall be fined not exceeding twenty dollars for each offence.

Sec. 2. The body of any person who shall have died of small-pox, diphtheria, scarlet fever, yellow fever, typhus fever, cholera, or any contagious or infectious disease, shall not be carried into any church, hall, building, or to any public place in this town, for the purpose of conducting funeral services, without a permit in writing being first had from the board of health of said town.

Sec. 3. The funeral of any person dying from any of the above named diseases shall be conducted privately, and no person allowed to attend the same except those whose attendance is necessary to give the body a decent and Christian burial.

Sec. 4. Any person violating either of the two preceding sections shall, upon conviction, be fined not less than five dollars, nor more than twenty dollars.

An Ordinance in Relation to Nuisances.

It is ordained by the Town Council of Richmond as follows:

Section 1. It shall be the duty of the police constables, town sergeant, and constables of this town, to examine into the state and condition of every place and part of this town, where he shall suspect or be informed that there exists any matter or thing which is or may be prejudical to the health of the inhabitants thereof.

Sec. 2. Whenever it shall appear to the satisfaction of the town council of this town that there exists upon any premises owned or occupied by any person or corporation, any dirt, offal, or animal or vegetable matter, or the contents of any barn, hog-pen, privy, drain or vault, calculated to injure the health

of the inhabitants of this town, or by noxious air to annoy the neighborhood, and that such nuisance or annoyance may be abated at an expense not exceeding ten dollars, the owners or occupants of such premises shall be forthwith notified in writing of the existence of such nuisance or annoyance by the town council, and directed forthwith to abate the same, and if such nuisance or annoyance shall not be abated within twenty-four hours after such notice, the town council shall authorize in writing the sheriff of the county of Washington, his deputies, or the town sergeant or either of the constables or police constables of said town, to cause such nuisance or annoyance to be abated, and the town council shall order the expenses thereof, not exceeding ten dollars, to be paid out of the town treasury to the said officer abating the same, and the owner or occupant of such premises shall pay a penalty of ten dollars, for which, together with the penalty aforesaid, the said owner or occupant shall be liable, and the same shall be recovered for the use of said town in an action of debt in the name of the town treasurer, before any court of competent jurisdiction.

SEC. 3. Whenever it shall appear to the satisfaction of the town council of said town that there exists upon the premises owned or occupied by any person or corporation, any matter or thing injurious to the health of the inhabitants of any part of said town, or which may originate or conduce to the spreading of any infectious or contagious disease, and that the expense of abating such nuisance or danger to health will exceed the sum of ten dollars, the owner or occupant of such premises upon which such nuisance exists, or the person who may have caused, continued, or permitted the said nuisance, shall be forthwith notified to appear before the town council at such time as the council shall appoint, to show cause why said nuisance shall not be abated or removed; and said council, upon satisfactory evidence to them submitted, that said nuisance or danger to health exists, may order the sheriff of said county, his deputies, the town sergeant, or either of the constables or police constables of said town, to forthwith abate the same, and the expenses thereof shall be paid out of the town treasury, and be recovered from the party causing or continuing the same, together with a penalty of twenty dollars, in the manner prescribed in the next preceding section.

AN ORDINANCE IN RELATION TO THE REGISTRATION OF BIRTHS AND DEATHS, AND THE INTERMENT OF THE DEAD.

It is ordained by the Town Council of the Town of Richmond, this 15th day of January, 1894, as follows:

SECTION 1. There shall be appointed by the town council a sufficient number of persons to act as undertakers, removable at the pleasure of the town council.

SEC. 2. Whenever any person shall die in this town, it shall be the duty of the physician attending in his or her last sickness, upon application, to furnish to the undertaker attending the funeral, a certificate, giving the name of the person, date of death, and the disease or the cause of his or her death.

SEC. 3. Every physician omitting or refusing to furnish such certificate, as aforesaid, shall forfeit and pay the sum of five dollars for each offence.

SEC. 4. No person shall bury, or place in a tomb, or remove from the town, or otherwise dispose of, the body of any human being who shall die in this town, without first reporting the death to the town clerk, and obtaining a permit from him.

SEC. 5. No permit shall be given, as provided in section four, until the town clerk is furnished with the information in relation to the deceased person required by the laws of the state for record, so far as the same can be ascertained, together with the physician's certificate of the cause of death, whenever a physician has been in attendance, or a coroner's certificate, whenever a coroner's inquest has been held. Whenever a permit for burial is applied for, in a case of death without the attendance of a physician, or if it is impossible to obtain the physician's certificate, it shall be the duty of the town clerk to investigate the case as far as may be necessary; and when he has obtained satisfactory evidence in relation to the cause and circumstances of the death, he shall give a permit. If not satisfied in relation to the cause and circumstances of the death, or if, in his opinion, the public good requires it, he shall report the case to a coroner for investigation.

SEC. 6. Whenever the body of a human being who has died out of the town shall be brought here for burial, the undertaker, or other person attending the funeral, shall furnish the report required in sections four and five, with the exception of the physician's certificate.

SEC. 7. Every person violating any of the provisions of this ordinance shall pay a fine of not less than five dollars, nor more than twenty dollars.

5. The town council is the board of health.
6. John L. Kenyon is the health officer.
7. Gratuitous vaccination has not been provided for.
8. Undertakers and clergymen are prompt in sending in their returns.

SOUTH KINGSTOWN.

1. There has been no work for the promotion of public health.
2. There has been no extension of the water service.
4. There have been no new ordinances.
5. The town council is the board of health.
6. F. C. Gould is the health officer.
7. Gratuitous vaccination has been provided and is not yet completed.
8. Undertakers are more prompt than formerly.
9. Clergymen make returns of marriages promptly.

WESTERLY.

1. There has been no work for the promotion of public health during the past year.

2. Some extension of the water service for general use; about forty per cent. of the population are now supplied with water.

3. No addition has been made to the sewage system. (See report of 1891, p. 80.) Ordinances exist relative to suppression of nuisances, control of contagious diseases and burial of the dead, and also in regard to vaccination.

4. There have been no new ordinances relating to sanitary affairs.

5. The town council is the board of health.

6. The health officers are Benj. York and James M. Pendleton.

7. The number of vaccinations during the year were very few.

8. Undertakers and clergymen report promptly.

REPORTS OF

HEALTH OFFICERS.

1894.

CIRCULAR TO HEALTH OFFICERS.

Following the practice of previous years, and in order to ascertain what degree of interest was taken in the work of sanitary inspection; what knowledge of the prevalence of contagious, infectious, or other acute and dangerous diseases; what means had been taken to prevent the spread of such diseases; and what other work had been accomplished in the different towns by the Health Officers of the same during 1894, the following circulars were sent at the close of the year:

CIRCULAR No. 131.

OFFICE OF SECRETARY OF THE STATE BOARD OF HEALTH,

PROVIDENCE, Jan. 1, 1895.

To the Health Officer of

DEAR SIR:—An important feature of the Annual Report of the Rhode Island State Board of Health is that of giving a connected history of the occurrence of contagious and epidemic diseases from year to year, as they may have prevailed in the different towns, whether epidemically or in a less degree, together with the location in the town (village or otherwise), and season of the year.

If the proportion of the fatal cases to the whole number of the cases of the same disease could be given, the value of such reports would be very much enhanced. Such proportion can be ascertained only in such towns as *by town ordinance* require physicians to report all cases of such diseases as come within their charge.

An approximate proportion can, however, be given, after the subsidence of the disease, by inquiry of persons living in the immediate neighborhood of the prevalence of such disease, as to the number of the sick, or by house to house visitation where the sickness occurred, with the same inquiry, and by the comparison of the deaths where recoveries are ascertained.

It is for the purpose of obtaining such information, in full or approximate, and also what may have been done to prevent and restrict diseases, that the questions in the enclosed circular (No. 132) are sent to the various Health Officers of the State.

If, therefore, you will have the kindness to reply to the questions in the said circular, according to the best knowledge you have been able to obtain, and forward in the enclosed stamped envelope, you will favor one of the most important interests of the State, and greatly oblige,

Yours truly,

GARDNER T. SWARTS,

Sec. State Board of Health.

CIRCULAR No. 132.

DEAR SIR:—Replies to the following questions, as suggested in the accompanying circular (No. 131) are respectfully solicited; said replies to be made on this circular, following each question:

1. Name of town.

2. Name of health officer.

3. Have there been, within your knowledge, any epidemics, or any large prevalence of contagious or infectious diseases in your town during 1894? If so, of what disease or diseases? in what locality or localities? how many of each disease? number of deaths? and in what months of the year?

Locality.	Diseases.	No. of Cases.	No. of Deaths.	Months in which they occurred.

4. Was isolation maintained or attempted?*

5. What proportion of the sick, if any, were isolated?

6. Was any inspection of premises made, where sickness prevailed, as to the sanitary condition of the cellars, pantries, sinks, sink drains, water closets, if any, cess-pools, out-house privies, distance of wells from accumulations of filth, etc., etc.? If so, please give a general statement as to whether they were

* According to the best knowledge obtainable.

sanitarily in conditions good or bad, or if anything or place was unusually unsanitary, give a full description. Or if the cause of any outbreak of disease was found, please state what?

7. Did you make any sanitary inspections during 1894, by order of the town council or from your own option? If so, what were they and how made?

8. Do you know of any location in your town that seems to be particularly unhealthy to any considerable number of persons? If so, and the cause is suspected, can such cause be removed at any reasonable expense?

9. Do you report to your town council nuisances dangerous to the public health, or unsanitary premises within your knowledge; or of buildings unsafe for occupants in case of fire? (See Chapter 495, Section 6, Public Laws.)

10. Has there, to your knowledge, been any contamination of any of the water, milk or ice supplies in your town?

11. Please give names and addresses of dealers in ice in your town?

REPORTS OF HEALTH OFFICERS.

BRISTOL COUNTY.

1. BARRINGTON.

2. A. C. Pierce, health officer.

3. There have been no epidemics during the past year.

4. Isolation, more or less complete, is attempted in all contagious diseases, where such a thing is possible.

5. When an over large family occupies a very small house, isolation is not practicable.

6. No official inspection was made, where sickness prevailed, as to the sanitary condition of cellars, sink drains, out buildings, etc.

7. No sanitary inspections were made during the past year.*

8. The people living in the vicinity of the clay banks of brick yards are very subject to malarial infection. No other unhealthy localities are known.

9. I have never reported to the town council any nuisances dangerous to the public health, any unsanitary premises within my knowledge, or any buildings unsafe for occupants in case of fire.

10. There has been, to my knowledge, no contamination of any of the water, milk or ice supplies of this town.

11. W. A. Leonard, of Drownville, and Ebenezer Tiffany, of Barrington, are the ice dealers of this town.

1. BRISTOL.

2. George H. Peck, health officer.

3. There have been no epidemics during the past year. The following contagious diseases have been reported: Typhoid fever, ten cases, which occurred as follows: January, one; July, one; August, one; September, two; October, two; November, three, and one death. Scarlet fever, eight cases; January, seven; February, one. Typhus fever, one case in June. Varicella, seven

---

*The town ordinance in relation to the duties of the health officer was not adopted by the town council until late in the year 1894, hence the lack of any official action of the health officer for the year. The health officer had no instructions or authority to act.

cases; June, five; July, two. Rotheln, one case in January. Measles, seven cases; January, two; February, two; March, two; and May, one.

4. Isolation was maintained in scarlet and typhus fever.

6. Inspection of premises where sickness prevailed was made, and sanitary condition of cellars, sink drains, out buildings, etc., was found to be fairly good.

7. Inspection of cesspools, vaults, and private sewers were made, and such as were dangerous were ordered to be cleaned.

8. No unhealthy localities in this town are known.

9. I have reported to the town council all nuisances dangerous to the public health, and all unsanitary premises within my knowledge.

10. There has been, to my knowledge, no contamination of any of the water, milk or ice supplies of this town.

11. John P. Reynolds is the ice dealer of this town.

1. WARREN.

2. Michael B. Conroy, health officer.

3. There have been no epidemics during the past year.

6. Several inspections of privy vaults and cellars have been made, but none, to my knowledge, have caused any disease.

8. No unhealthy localities in this town are known.

9. All nuisances dangerous to the public health, and all unsanitary premises, where any such exist, are reported to the town council.

10. There has been, to my knowledge, no contamination of any of the water, milk or ice supplies of this town.

11. Ebenezer Tiffany, of Barrington, John H. Brown, of Warren, and Walter H. Bosworth, of Warren, are the ice dealers of this town.

KENT COUNTY.

1. COVENTRY.

2. A. C. Richmond, M. D., health officer.

3. An epidemic of typhoid fever of two months duration (July and August, 1894), occurred at Anthony, during which there were eight cases and two deaths.

4. Isolation was maintained.

5. All of the sick were isolated. None but those who had care of them were admitted.

6. Inspection was made. In two families it was found that the cesspool leaked into the cellar, but in all other cases no unsanitary causes could be found.

7. All cellars, privy vaults, etc., were duly inspected, and all unsanitary causes, where any such existed, were removed.

8. No unhealthy localities in this town are known.

9. As yet there has been no reason to make any reports pertaining to unsanitary premises or unsafe buildings.

10. There has been, to my knowledge, no contamination of the water, milk or ice supplies of this town.

11. Job Manchester, of Anthony, and Daniel Wood, of Washington, are the ice dealers of this town.

1. EAST GREENWICH.

2. E. G. Carpenter, M. D., health officer.

3. There have been no epidemics during the past year.

4. The few sporadic cases of contagious diseases have been isolated, or as nearly as possible.

6. Some cases of bad drainage have been attended to, but nothing unusually unsanitary has been found.

7. Inspections of sink drains, cesspools, privies, etc., were made from my own option and from the complaints of neighbors.

8. No unhealthy localities in this town are known.

9. Reports are made, when necessary, to the town council in regard to unsanitary premises, unsafe buildings, etc.

10. There has been, to my knowledge, no contamination of the water, milk or ice supplies of this town.

11. C. E. Sweet, of East Greenwich, and George Sunderland, of East Greenwich, are the ice dealers of this town.

1. WEST GREENWICH has no health officer.

1. WARWICK.

2. Albert G. Sprague, M. D., health officer.

3. There have been no epidemics during the past year. The contagious diseases reported have been as follows: In March and April, thirty cases of scarlet fever; and in February, March, April and August, nine cases of typhoid fever. The scarlet fever occurred in Pawtuxet, Lakewood and vicinity, and the typhoid fever was scattered all over the town. The number of deaths in each instance was unknown.

4. Isolation was maintained.

5. All the sick were isolated.

6. Inspection was made where sickness prevailed as to the sanitary condition of cellars, sink drains, etc., but no cause could be found to account for the outbreak.

7. Sanitary inspections were made on the complaint of different individuals.

8. No unhealthy location in this town is known.

9. All unsanitary premises and public nuisances with the exception of unsafe buildings are reported.

10. There has been to my knowledge, no contamination of the water, milk or ice supplies of this town.

11. Manchester Bros. and Spring Lake Ice Co. are the ice dealers of this town.

NEWPORT COUNTY.

1. JAMESTOWN.

2. Abbott Chandler, health officer.

3. Only one case of scarlet fever was reported during the past year.

6. Inspections were made where sickness prevailed as to the sanitary condition of cellars, sink drains, out houses, etc., and everything was found in good condition.

7. Inspections were made in the thickly settled part of the town, and all privy vaults and sink drains were put in good condition.

8. No unhealthy localities in this town are known.

9. All public nuisances, dangerous buildings, and unsanitary premises are reported to the town council.

10. There has been, to my knowledge, no contamination of the water, milk or ice supplies of this town.

11. Isaac L. Clarke and Amos L. Pecham are the ice dealers of this town.

1. LITTLE COMPTON has no health officer.

1. MIDDLETOWN.

2. John Pechham, health officer.

3. No epidemics occurred during the past year, only a few light cases of whooping cough.

4. Isolation in regard to schools and churches was maintained.

5. All of the sick were isolated.

6. Inspection of premises where sickness prevailed was made but nothing unsanitary was found.

7. Inspections were made during the past year, and at my own option, of sink drains and privies.

8. No unhealthy localities in this town are known.

9. All public nuisances are reported to the town council, as they cannot be abated without so doing.

10. Contamination has taken place if sink drains and closets can contaminate water.

11. There are no ice dealers in this town.

1. New Shoreham.

2. H. A. Mott, health officer. No report.

1. Newport.

2. George C. Shaw, health officer.

3. There have been no epidemics during the past year. The contagious diseases reported have been as follows: Scarlet fever, January, six cases; February, five; March, nine; April, seven; May, eight; June, two; September, four; November, two; December, eleven; total, fifty-four, and one death. Diphtheria, March, one; May, one; June, four; August, three; September, one; October, four; November, six; December, three; total, twenty-three, and five deaths. Typhoid fever, January, two; February, one; March, three; May, three; July, one; August, two; September, one; October, one; November, two; total, sixteen, and ten deaths.

4. Isolation was maintained.

5. All cases of scarlet fever and diphtheria were isolated.

6. Inspection was made, where sickness prevailed, of cellars sink drains, out houses, etc.

7. Sanitary inspections were made from house to house during the past year.

11. The Arctic Ice Co., the Newport Ice Co., and the Citizens Ice Co., are the ice dealers of this city.

1. Portsmouth.

2. William T. Harvey, health officer.

3. There has been no epidemic during the past year.

6. No inspection of premises where sickness prevailed was made. The sanitary conditions are generally good.

7. No sanitary inspections were made during the past year.

8. No unhealthy localities in this town are known.

9. All public nuisances, unsanitary premises, etc., are reported to the town council.

10. There has been, to my knowledge, no contamination of the water, milk or ice supplies of this town.

11. Nelson R. Read is the ice dealer of this town.

1. Tiverton.

2. Green Trip, health officer. No report.

PROVIDENCE COUNTY.

1. Burrillville.

2 Thomas Quinn, health officer.

3. No epidemics occurred during the past year. There were nineteen cases of scarlet fever, which were located in Pascoag, Harrisville and Turkeyville, and occurred during the following months: June, one case; July, five; August, one; October, seven: November, two: December, three: and no deaths.

4. Isolation was maintained.

5. All of the sick were isolated.

6. The sanitary conditions of the town are fair.

7. A sanitary inspection of sink drains and privy vaults on the complaint of a tenant, and they were thoroughly cleaned out and put in order.

8. No unhealthy localities in this town are known.

9. All public nuisances, unsanitary premises, etc., are reported to the town council.

10. There has been, to my knowledge, no contamination of the water, milk or ice supplies of this town.

11. Samuel F. Thayer and R. S. & F. W. Wood, of Harrisville, and John F. Moore, of Pascoag, are the ice dealers of this town.

1. CRANSTON.

2. Dan O. King, M. D., health officer.

3. A few cases of diphtheria, and a few deaths from the same, occurred during the months of April, May and June. Scarlet fever, from which there were seven deaths, was very prevalent during the year.

4. Isolation was maintained.

5. Orders were given for all cases of contagious diseases to be isolated in separate rooms.

6. Inspection was made of the village of the Cranston Print Works which was found to be in a very bad sanitary condition.

7. Several sanitary inspections were made during the past year by order of the town council.

8. The only unhealthy locality in this town is the village of the Cranston Print Works, which could very easily be rendered healthy with proper care and reasonable expense.

9. All public nuisances, unsanitary premises, etc., are reported to the town council.

10. There has been, to my knowledge, no contamination of the water, milk or ice supplies of this town.

11. The Auburn Ice Co. are the ice dealers of this town.

1. CUMBERLAND.

2. George B. Haines, health officer.

3. There have been no epidemics during the past year. The health of the community has been exceptionally good.

4. Isolation was maintained.

5. The few cases of scarlet fever and diphtheria were isolated.

6. I was called to inspect a few premises and my recommendations were cheerfully complied with.

7. Sanitary inspections during the past year were made at my own option.

8. No unhealthy localities in this town are known.

9. I had no occasion to report any public nuisances, etc., during the past year.

10. There has been, to my knowledge, no contamination of the water, milk and ice supplies of this town.

11. The Pawtucket Ice Co., the Moshassuck Ice Co., the Crystal Ice Co., and the Lonsdale Ice Co., are the ice dealers of this town.

1. East Providence. No report.

1. Foster.

2. Henry Arnold, health officer.

3. No epidemics occurred during the past year.

4. Isolation was maintained.

6. In a few instances, inspection of premises, where sickness prevailed, was made.

7. During the past year, I examined, at my own option, four or five wells.

8. No unhealthy localities in this town are known.

9. All public nuisances, unsanitary premises, etc., are reported to the town council.

10. There has been, to my knowledge, no contamination of the water, milk or ice supplies of this town.

11. There are no ice dealers in this town.

1. Glocester.

2. G. A. Harris, M. D., health officer.

3. There have been no epidemics during the past year.

7. On complaint of neighbors, one tenement block in Chepachet village was inspected, and foul sink drains and a pig pen, which caused troublesome odors, were found. Report was made to the council and the nuisance ordered abated. Subsequent inspection showed the trouble removed.

8. No unhealthy localities in this town are known.

9. All public nuisances, unsanitary premises, etc., are reported to the town council.

10. There has been, to my knowledge, no contamination of the water, milk or ice supplies of this town.

11. Leward Hopkins, of Chepachet, is the ice dealer of this town.

1. JOHNSTON.

2. John W. Waters, health officer.

3. There have been no epidemics during the past year. The contagious diseases reported were as follows: Diphtheria, January, three cases; February, one; May, one; June, one; October, one; December, five; total, twelve. Scarlet fever, January, six; February, two; March, two; April, one; June, four; July, two; August, one; December, nine; total, twenty-seven. Typhoid fever, January, two; February, one; April, one; August, one; September, four; October, one; November, one; total, eleven.

4. Isolation was not maintained.

5. None of the sick were isolated.

6. Inspections were made, where sickness prevailed, as to the sanitary condition of cellars, sink drains, out houses, etc.

7. Sanitary inspections were made during the past year.

8. No unhealthy locations in this town are known.

9. All public nuisances, unsanitary premises, etc., are reported to the town council.

10. There has been, to my knowledge, no contamination of the water, milk or ice supplies of this town.

11. The Pocasset Ice Co., the Hughesdale Ice Co., and the Wallum Pond Ice Co., are the ice dealers of this town.

1. LINCOLN.

2. N. Malo, M. D., health officer.

3. No epidemics occurred during the past year. The contagious diseases reported were, one hundred seventeen cases of scarlet fever, from which six deaths resulted. This disease occurred in Central Falls and lasted throughout the year.

4. Isolation was maintained

5. All of the sick, as far as practicable, were isolated.

6. Inspection of premises, where sickness prevailed, was made in every case, but no special cause could be found.

7. Sanitary inspections were made, at my own option, during the past year.

8. No unhealthy localities in this town are known.

9. All public nuisances, unsanitary premises, etc., are reported to the town council.

10. Water from a small well was found contaminated, in one instance.

11. The Moshassuck Ice Co., Spaulding Bros., and L. L. Lullie, are the ice dealers of this town.

1. NORTH PROVIDENCE.

2. Sanford E. Kinnecom, health officer.

9. All public nuisances, unsanitary premises, etc., are reported to the town council.

10. There has been, to my knowledge, no contamination of the water, milk or ice supplies of this town.

11. Charles O. Angell, of Geneva, and William A. Sweet, of Centredale, are the ice dealers of this town.

1. NORTH SMITHFIELD.

2. John B. Green, health officer.

3. There have been no epidemics during the past year.

6. Inspection of premises, where sickness prevailed, was made, as to the sanitary condition of sink drains, cesspools, out houses, etc.

7. Sanitary inspections were made during the past year, at Forestdale, Slatersville and Waterford.

8. No unhealthy localities in this town are known.

9. All public nuisances, unsanitary premises, etc., are reported to the town council.

10. There has been, to my knowledge, no contamination of the water, milk or ice supplies of this town.

11. Day & Armstrong, of Millville, Mass., are the ice dealers of this town.

1. PAWTUCKET.

2. F. R. Jenks, city physician.

3. There have been no epidemics during the past year.

4. Isolation was maintained.

5. All of the sick were isolated.

6. Inspection of premises, where sickness prevailed, was made, and sanitary conditions were found to be good. No unsanitary places were found or any cause for the outbreak of disease.

7. Sanitary inspections have been made, during the past year, of the Grove and Garden street school houses. The sanitary condition of the Grove street school was bad; that of the Garden street school, good.

8. No unhealthy localities in this city are known.

9. All public nuisances, unsanitary premises, etc., are reported to the city council.

10. There has been, to my knowledge, no contamination of the water, milk or ice supplies of this city.

11. The Central Falls Ice Co., the Pawtucket Ice Co., and the Seekonk Ice Co., are the ice dealers of this city.

1. PROVIDENCE CITY.

2. Superintendent of Health, Charles V. Chapin, M. D.

3. The following extracts from Dr. Chapin's report will fully answer all questions in Circular No. 132.

The number of deaths reported during the year was 2,896, which was 243 less than in the preceding year. The estimated population in 1894 was 153,000, and the death rate based upon this was 18.92, or less than any year since 1885. The average for the preceding 38 years was 19.91 per thousand.

There were 278 deaths from diarrhœal diseases in 1894. This was 31 less than in the preceding year. The 278 deaths were 9.60 per cent. of the total deaths.

There were in 1894 twelve deaths from malarial diseases, two more than in 1893.

Epidemic influenza reappeared in December, 1893, and continued into the early part of 1894, causing 73 deaths in the first quarter, of which 57 were in January. The total deaths from this cause during the year were 78.

CONTAGIOUS DISEASES.

The diseases referred to under this heading in this report are measles, whooping cough, scarlet fever, typhoid fever, diphtheria, phthisis and small-pox.

There were 5 deaths from measles in 1894, while in the preceding year there were 63. This well illustrates the marked periodicity of this disease.

Whooping cough caused 53 deaths in 1894.

The number of deaths from scarlet fever in 1894 was 56, which was 41 less than in the preceding year. This was 1.93 per cent. of the deaths from all causes.

There were 70 deaths from typhoid fever, or 2.42 per cent. of the deaths from all causes. Fourteen of these deaths were in January.

Diphtheria caused 46 deaths, the same as in 1893, or 1.59 per cent. of all deaths.

There were 331 deaths from phthisis in 1894, or 6 more than in 1893. This was 11.43 per cent. of all deaths.

Cases of scarlet fever, typhoid fever and diphtheria are reported to this office by the attending physicians, who are by law required to make these reports without compensation. The faithfulness and care with which this is done by almost all, speaks highly for their interest in their profession and in the public welfare. Some few cases of contagious disease, where there is no physician in attendance, are brought to light through the reports of school teachers or by the personal investigations of the medical inspector.

The following list shows the number of cases of contagious diseases during the last eight years that the attending physician failed to report and which were discovered in other ways:

YEAR.	Scarlet Fever.	Typhoid Fever.	Diphtheria.
1886	14	11	21
1887	125	18	62
1888	29	4	50
1889	4	6	15
1890	2	4	7
1891	6	7	9
1892	6	6	1
1893	11	9	2
1894	24	12	1

In addition to the above, during 1894, twelve cases of scarlet fever and three of diphtheria were discovered by the medical inspector where there was no physician in attendance.

When cases of contagious disease are visited by the medical inspector, the premises are usually examined by him with reference to unsanitary conditions. In the better class of residences, however, particularly when the owner of the house is its occupant, the inspection is omitted unless requested. The results of these examinations, as presented in my report for 1890, seemed to indicate that there was no causative relation between unsanitary conditions as ordinarily understood, and scarlet fever, diphtheria and typhoid fever. I have seen nothing in the results of the examinations in subsequent years to change this view. Below are presented in tabular form the data obtained during the ten years 1886 to 1895, and as "unsanitary conditions," so called, do not appear to stand in any causative relation to these contagious diseases the subject will not receive further consideration.

RESULTS OF THE EXAMINATION OF PREMISES IN CASES OF CONTAGIOUS DISEASES.

SCARLET FEVER.

YEAR.	Vaults Full.	Cesspools Full.	Yards Filthy.	Untrapped Sinks.	Defective Waste-Pipes and Drains.	Filthy Cellars.	No Nuisance.	Total.
1885	23	11	14	113	56	20	32	269
1886	16	4	4	101	61	4	45	235
1887	70	9	14	232	88	5	247	665
1888	14	3	9	42	34	3	128	233
1889	4	4	....	42	9	......	51	110
1890	4	2	....	19	4	... .	56	85
1891	14	3	3	57	17	2	157	253
1892	12	....	7	31	15	... .	186	254
1893	7	7	8	70	22	2	224	410
1894	7	3	4	45	9	2	400	470
Total	171	46	63	755	315	38	1,526	2,984

DIPHTHERIA.

Year.	Vaults Full.	Cesspools Full.	Yards Filthy.	Untrapped Sinks.	Defective Waste-Pipes and Drains.	Filthy Cellars.	No Nuisance.	Total.
1885	8	3	4	33	20	4	28	100
1886	24	4	3	97	55	2	86	271
1887	25	5	2	112	49	4	87	284
1888	20	2	7	80	32	4	92	237
1889	16	7	4	68	27	6	89	217
1890	17	1	3	52	28	....	102	203
1891	10	3	5	42	10	2	81	153
1892	3	1	2	12	6	1	73	98
1893	1	1	....	22	7	5	80	116
1894	2	4	2	14	....	....	104	126
Total	126	31	32	532	234	28	822	1,805

TYPHOID FEVER.

Year.	Vaults Full.	Cesspools Full.	Yards Filthy.	Untrapped Sinks.	Defective Waste-Pipes and Drains.	Filthy Cellars.	No Nuisance.	Total.
1885	10	3	5	39	28	3	12	100
1886	25	3	6	57	32	4	26	153
1887	10	1	2	27	9	1	21	71
1888	29	9	11	163	51	13	154	430
1889	9	3	1	61	21	3	96	194
1890	13	5	....	27	11	....	46	102
1891	11	1	6	46	20	....	111	195
1892	8	....	3	19	12	5	102	149
1893	4	1	4	15	9	2	100	135
1894	6	3	4	33	6	....	187	239
Total	125	29	42	487	199	31	855	1,768

The Rhode Island Hospital now receives patients suffering with contagious diseases, providing pay for the same at the rate of $15.00 per week is assured. During the year thirty-one cases were removed to the hospital under my direction, and the total expense to the city in caring for them was $2,297.07. These patients were all transported in the ambulance belonging to the department. Of the thirty-one patients twenty-seven were scarlet fever and four diphtheria. As was pointed out in my last report, the facilities for caring for these cases at the hospital are entirely inadequate.

SCARLET FEVER.

There were 111 less cases and 41 less deaths in 1894 than in 1893.

The mortality from this disease varies considerably from year to year. Thus, in 1888, the apparent mortality was 22.16 per cent., but in reality it was rather less, as many of the children who died in the early part of that year were taken sick in the preceding December. The true average for 1887 and 1888 would probably be not far from 20 per cent. In 1891 the mortality was only 4.19 per cent., not much more than one-fifth as much as in 1887–8.

Scarlet fever tends to recur in epidemics every few years. Thus during the last forty years there have been eight of these exacerbations. It is only since 1885 that active measures have been taken by the health department to prevent the spread of this disease. The methods referred to are the placarding of houses, exclusion of children from school, frequent inspections, disinfection, etc. It can hardly be doubted that scarlet fever is much more generally reckoned a contagious disease than it was twenty years ago, and it is extremely probable that it is chiefly to the recognition of this fact and the consequent precautions that are taken that the disease has been so considerably diminished during this period.

The following table gives the results of my observations during the past eight years concerning certain points in the etiology and prevention of scarlet fever. This table does not include all the families and cases, as some pass from observation through removal or otherwise; but for 1893 and 1894 all cases are included:

	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	Total.
Number of families in which there were more than one susceptible child........	232	244	73	66	198	220	345	359	1,737
Number of these in which there was a second case	130	147	30	27	78	90	150	177	829
Number of susceptible children in all the above families	986	827	242	215	605	711	1,212	1,293	6,091
Number of these children who were attacked	452	511	126	105	341	389	642	687	3,253
Number of additional familes with susceptible children in the house where the disease appeared	112	128	18	15	98	154	198	244	967
Number of susceptible children in these families..............................	381	354	34	30	238	260	493	587	2,486
Number of these additional families attacked	27	16	0	2	10.	21	16	20	112
Number of children in these families who were attacked.........................	58	21	0	2	12	44	34	34	205

	1887.	1888.	1889.	1890.	1891.	1892.	1893.	1894.	Total.
Number of families where inunction was practiced	87	99	36	38	124	126	172	..	682
Number of instances in the above families where the disease spread beyond the first case	44	64	12	15	46	60	131	..	372
Number of susceptible children in these families	218	496	191	132	582	413	717	..	2,549
Number of these children who were attacked	148	319	56	65	198	241	444	..	1,471
Number of tenements disinfected where there were other families with susceptible children in the house	49	56	10	4	20	26	42	109	316
Number of above where the disease spread to other families in the house	5	5	0	0	2	1	2	2	17
Number of susceptible children who were at once removed	23	18	10	9	27	42	86	102	317
Number of these who were attacked on their return	3	1	0	0	0	2	8	4	18
Number of children who were exposed and who had previously had scarlet fever	..	..	..	..	..	..	..	100	100
Number of these who were attacked a second time	..	..	..	..	..	..	..	13	13
Number of adults who were exposed and who had previously had scarlet fever	..	..	..	..	..	..	..	230	230
Number of these who were attacked a second time	..	..	..	..	..	..	..	8	8
Number of above with susceptible children where there was isolation	..	..	..	..	41	27	127	37	232
Number of families where more than one child was attacked	..	..	..	..	23	13	32	14	82
Number of susceptible children in families where there was isolation	..	..	..	..	130	69	291	96	586
Number of the above who were attacked	..	..	..	..	52	23	108	52	235

The following table shows the number and percentage of persons of different ages exposed to scarlet fever who contracted it and also the number who did not. When I began to collect these facts the inspector was not careful to obtain the age in every case, so that until 1890 only a portion of the cases are contained in the table, and it was only in 1894 that the facts in regard to all the adults in the family were obtained.

SCARLET FEVER.

Ages.	Cases.								Number Exposed.								Ratio of Cases to Number Exposed.
	1887-88.	1889.	1890.	1891.	1892.	1893.	1894.	Total.	1887-88.	1889.	1890.	1891.	1892.	1893.	1894.	Total.	
Under 1 year.	21	7	1	12	23	22	10	96	105	11	1	40	54	77	76	364	26.3
1 "	27	9	3	15	21	45	41	161	75	11	7	28	45	74	68	308	52.2
2 years	86	14	8	23	33	73	56	293	156	21	16	45	52	108	88	486	60.2
3 "	86	13	9	30	39	74	76	327	159	18	13	49	62	98	102	501	65.2
4 "	83	21	12	32	43	83	62	336	138	35	13	46	59	110	88	489	68.7
5 "	71	11	9	48	56	89	84	368	169	14	14	59	77	117	125	575	64.0
6 "	83	18	12	42	42	98	75	370	148	21	19	59	58	129	94	528	70.0
7 "	80	13	10	40	42	72	70	327	131	20	18	61	61	111	96	498	65.6
8 "	61	7	15	17	32	66	55	253	125	18	25	41	46	104	87	446	56.7
9 "	55	6	13	31	32	43	35	215	117	31	18	49	52	77	58	402	53.4
10 "	35	6	10	18	13	32	43	157	77	13	6	33	33	70	69	301	52.1
11 "	37	4	2	24	18	25	19	129	82	14	8	42	27	54	47	274	47.0
12 "	24	5	5	8	15	24	27	108	75	14	15	27	37	58	46	272	39.7
13 "	20	4	9	10	9	16	12	80	66	7	10	20	21	46	38	208	38.4
14 "	15	4	2	14	9	12	16	72	53	12	11	19	19	43	44	201	35.8
15 "	12	2	4	7	1	10	11	47	52	9	6	15	12	30	37	161	29.1
16 "	9	2	1	8	4	6	5	35	32	4	11	16	13	27	30	133	26.3
17 "	5	2	1	2	5	9	3	27	25	6	2	6	13	21	23	96	28.1
18 "	....	....	4	3	6	2	3	18	1	1	8	5	14	20	19	68	26.4
19 "	3	2	1	3	1	8	....	18	13	2	1	6	4	19	20	65	27.6
20 "	4	2	2	3	2	5	3	21	10	4	4	8	6	16	16	64	32.8
Adults.......	36	3	3	15	23	46	43	169	52	4	50	81	138	509	847	1681	10.0
Total....	853	155	136	405	466	860	749	3624	1861	290	286	755	903	1918	2118	8131	44.5

From the data given on the preceding pages I think several interesting conclusions can be derived. In the first place it can be seen that the relative value of the figures (with a few exception to be explained) varies little from year to year. Hence, conclusions drawn from a single year are verified by comparison with other years, and there is little likelihood that the numbers in the totals are not large enough for generalization.

It is clear that susceptibility varies very much according to age. The only way

to really get at age susceptibility is to take under consideration a large enough group of children who have been actually exposed to the disease. It is certainly fair to assume that the children of a family where the disease exists are thus exposed. The one who first takes it certainly is, and from what I have seen I know that in this city in the majority of cases there is not the slightest attempt at isolation, and I am also sure that when the attempt is made it is very often entirely inadequate An examination of the table on page 84 will show that there is much less susceptibility during the first year of life than during the second, and less during the second than the third. The third to the fifth years, inclusive, are the most susceptible, for of 2,591 children of these ages exposed, 1,728, or 66.6 per cent., were attacked. From this age on, the liability to contract the disease diminishes. It is probable that the fifth and sixth years are the most susceptible. At first sight the table referred to looks odd, for there are many more children between the ages of two and eight than at either earlier or later ages, while we know that in the general population there must be a continuous diminution in the number of children from birth onwards. But as the average family does not contain over three children, and as the enquiry itself presupposes one, and in most cases more than one susceptible child, it is evident that we are dealing with selected families (selected by scarlet fever), and therefore it is no surprise that an unusual age distribution is seen. Yet it is not claimed that the figures given are absolutely accurate, especially as regards the ages over 14, for until within a year or two the inspector was not careful to enumerate all over that age. Yet as the proportions, except as just noted, vary very little each year, it is probable that the conclusions are justified. Taking the total number of persons under 21 years of age, it is seen that 53.6 per cent., or a little more than one-half, are liable to attack if exposed. Below the age of one, the chance of attack is, roughly speaking, one in four; between the third and fifth years, it is three in four; and after the twelfth year it sinks to one in four again.

As regards the immunity conferred by one attack of scarlet fever against a subsequent infection, data was gathered only during the year 1894. They are not, therefore, numerous enough to base very certain conclusions upon, but I shall be surprised if in subsequent years they are not fairly well confirmed. The greatest chance of error is in regard to the fact of the first attack. The diagnosis is not always to be relied upon, and the memory also is uncertain. But the figures as obtained (see page 83), show that of 100 children who had had a previous attack, 13 per cent. were attacked again; while as I have shown above, if there was no immunity, 53 per cent. would have yielded. Of 230 adults who had previously had scarlet fever, 3.4 per cent. were attacked, while of the adults who had never had it 5.6 per cent. were attacked. These figures, if correct, would show that age conferred greater immunity than a previous attack.

It has been shown that when families with more than one susceptible child are attacked with scarlet fever, and no pretense at isolation is made, the disease spreads beyond the first case in about 55 per cent., involving 54.8 per cent. of the children in these families. When isolation is fairly maintained, however, it spreads beyond the first case in 35.3 per cent., and involves 40.1

per cent. of the children. Thus it will be seen that isolation, as ordinarily carried out, has a very considerable protective power, considerably more than the above figures would indicate, for quite a proportion of the "secondary" cases are not really secondary, but were exposed to the same contagion as the primary case, and of course could not have been protected by any isolation. It is very rare indeed that perfect isolation in maintained when sick and well are kept in the same house. Yet the somewhat imperfect attempts that are made, are, I think, of undoubted value.

It is only by the removal of the well children from the house, or the placing of the sick person in a hospital, that real isolation can in most cases be secured. The value of such removal of well children is shown by the fact that of 317 children who were at once removed, only 18, or 5.6 per cent., were attacked on their return. If these children had remained at home, doubtless half of them would have yielded to the disease. As regards the value of removal to the hospital there are not many available facts. A considerable number of the persons who go to the hospital are servants or students, who would not be brought in contact with children if they remained at home. Such persons go to the hospital for their own good, not that of others. I have a record of fourteen instances where persons suffering with scarlet fever were removed to the hospital, and after discharge returned home where they were brought in contact with twenty-five susceptible children. In not one instance did any of these children contract the disease. This speaks well for the isolation and disinfection at the hospital. The rule is there to keep the patient until desquamation has entirely ceased on all parts of the body.

The time during which the 317 children referred to above were kept away from their homes when scarlet fever prevailed is of much interest. It is my intention to have them stay away until the sick person is entirely through desquamation and the house has been disinfected. Quite often the parents become impatient and take the children home earlier than should be done.

The following shows the time the children were away:

	Number of Weeks Away.							
	1	2	3	4	5	6	7	over 7.
Children who were attacked on return	2	4	5	5	2			
Children who were not attacked on return............	18	20	30	53	90	61	16	13

Of the eighteen cases that contracted the disease on return home, eleven returned before or during the third week, and five during the fourth week, and two only remained away five weeks. In one of the latter the desquamation of the sick child had not ceased when the well one returned, and in the other there was no disinfection. In no case did these eighteen children stay away as long as they were advised by this department. Nevertheless, it can be seen

from the above figures that a considerable number of children can return home before the end of the fourth week. But with our present knowledge of the disease I do not think we can determine definitely when all danger of contagion has ceased. From what I have seen I do not feel at all certain that the child may not be contagious after desquamation has ceased, nor am I sure that in some cases desquamation may not continue for a while after all danger has ceased. With our present knowledge I think five weeks is a fair time for isolation, though I should usually continue it if there was still desquamation.

Of the four cases in 1894 in which a child was removed at the beginning of the disease and attacked on its return, in one, though five weeks had elapsed, desquamation had not ceased. In another case nearly five weeks had elapsed but even approximate disinfection was impossible, as the child had been all over the house. In two cases the child returned in just three weeks. The period between the return and the first symptoms of the disease in these four cases was three, seven, eleven, and fourteen days.

The following table shows the time which elapsed between the first case in a family and the subsequent cases:

	Day.							Week				
Day and week of first case	1	2	3	4	4	6	7	1	2	3	4	5 and over.
Number of cases occurring	141	56	87	97	72	57	44	554	332	157	75	63

Of course a great many of those who are attacked during the first week are probably to be referred to the same contagion as that which gave rise to the first case. It would appear that when scarlet fever once enters a family, if other children are to be attacked they will in most instances be taken sick within two weeks, for of 1,181 children, 886 were attacked within this period. Of 103 instances where the disease spread to other families in the house, 28 were invaded in the first week, 19 in the second, 11 in the third, 17 in the fourth, and 28 in the fifth or later. This would indicate that the time of greatest danger of the spread of the disease from one family to another is during the last part of the disease, when precautions are relaxed and yet the danger of contagion continues. The cases tabulated above do not include all the cases during the last eight years, for the earlier cases were not recorded in such a way that they could now be made use of for this purpose, for the consideration of these points was not then entered upon.

It is quite generally believed that inunction, if properly carried out, is a great hindrance to the spread of scarlet fever. I once held that view and so strongly as to make special effort to urge its practice on both physicians and laity. I do not know now but that inunction, if thoroughly done twice a day over the whole body, including the scalp, and kept up for five or six weeks, is really of value. But I know that such inunction can rarely be secured, and the kind of inunction that is employed is of no prophylactic value. This is shown by the following:

	Where inunction was practiced.	In all families.
Percentage of families in which the disease spread..........	54 5	47 7
Percentage of children attacked.	57.7	53.4

It would appear that inunction favored rather than hindered the spread of scarlet fever, and I can believe that this may be to some extent true, for I know that in some instances so much reliance was placed on inunction that no attempt at isolation was made when without inunction there might have been such an attempt. I have now ceased urging inunction and no longer preserve data concerning it.

In regard to the value of disinfection there is not much evidence. Of 316 instances in which there were other families in the house with susceptible children the disease spread to a second family twenty-seven times after disinfection. In almost all cases where well children were removed the premises were disinfected before their return.

Besides the cases tabulated on page 84 there were in 1894, twenty-three cases of scarlet fever in the Children's Home on Tobey street, extending from September 4 to Novmber 24.

DIPHTHERIA.

As is well known, diphtheria first appeared in Providence in 1858. From that time it varied considerably in prevalence until 1877–8, when there was a great increase, causing in 1877 as many deaths even as phthisis. Since that time there has been much less of it but still more than in the first few years following its advent.

Deaths per 100,000 living.

The following table shows certain interesting facts in the natural history of this disease:

	1889.	1890.	1891.	1892.	1893.	1894	Total.
Number of families in which there was more than one child	121	112	102	77	105	102	619
Number of these in which there was more than one case....................................	47	42	37	19	32	29	206
Number of children in all the above families.......	472	422	356	269	356	345	2,220
Number of these children who were attacked......	231	191	164	112	91	144	933
Number of additional families with children, in the same house..	38	59	41	62	64	68	332
Number of children in these families..............	95	167	89	171	185	176	883
Number of these additional families attacked......	7	11	3	1	1	5	28
Number of children in these families who were attacked.	11	14	7	1	1	5	39
Number of tenements which were disinfected where there were other families with children in the house.......	9	14	14	9	16	26	88
Number of instances of the above where the disease spread to other families in the house....... ...	1	4	0	1	0	1	7
Number of well children who were at once removed.	26	28	26	31	42	27	180
Number of these who were attacked on their return.	0	2	0	3	1	0	6
Number of those exposed who had a previous attack	51	38	20	18	40	42	209
Number of the above attacked	25	8	13	6	10	5	67

The following table shows the number and percentage of persons of different ages exposed to diphtheria who contracted it, and also the number who did not:

DIPHTHERIA.

Ages.	Cases.							Number Exposed.							Ratio of Cases to Number Exposed.
	1889.	1890.	1891.	1892.	1893.	1894.	Total.	1889.	1890.	1891.	1892.	1893.	1894.	Total.	
Under 1 year.	3	10	3	4	5	4	29	23	36	15	21	25	23	143	20.2
1 "	13	11	8	6	12	7	57	23	20	22	13	17	25	120	47.5
2 years	23	29	15	10	17	14	108	32	42	27	19	29	29	178	60.6
3 "	18	26	29	10	20	9	112	36	40	39	21	25	22	183	61.2
4 "	23	24	18	12	19	18	114	32	39	32	27	31	24	185	61.0
5 "	27	21	23	13	10	25	119	37	38	41	28	25	37	206	57.7
6 "	23	19	9	8	14	17	90	39	29	23	14	30	29	164	54.8
7 "	17	14	13	14	8	5	71	35	34	23	26	19	79	156	45.5
8 "	14	19	11	4	15	13	76	25	33	29	10	26	32	155	49.0
9 "	10	13	8	10	6	5	52	25	27	18	19	18	16	123	42.2
10 "	13	13	6	7	3	4	46	22	27	16	19	17	18	119	38.6
11 "	11	6	7	3	2	4	33	19	20	10	11	14	15	89	37.0
12 "	15	12	10	3	5	8	53	28	25	25	9	18	12	117	45.2
13 "	4	4	3	1	2	3	17	9	19	10	9	8	10	65	26.1
14 "	3	8	2	....	5	1	19	13	20	6	5	12	6	62	30.6
15 "	4	2	6	1	1	1	15	9	8	13	6	6	12	54	27.7
16 "	2	9	2	1	....	1	15	6	24	9	6	13	6	64	23.4
17 "	2	3	9	1	2	3	20	8	4	16	3	8	6	45	44.4
18 "	3	4	3	....	4	1	15	6	8	8	7	8	6	43	34.8
19 "	2	....	....	2	2	2	8	5	3	2	4	12	4	30	26.6
20 "	2	2	1	2	1	1	9	4	5	4	2	7	3	25	36.0
Adults.......	36	49	32	21	39	17	194	267	485	181	210	350	273	1,776	10.9
Totals......	268	298	218	132	192	163	1,271	703	986	569	479	718	627	4,092	31.0

PHTHISIS.

Phthisis is now properly classed among the contagious diseases. In 1890 a circular was issued from this department explaining the nature of this disease and urging the proper isolation and disinfection in the care of these cases.

Since then the daily press and the recommendations of physicians have done much to disseminate a proper understanding of this disease. It has been claimed by some that the carrying out of the treatment recommended has resulted in a considerable decrease in this disease. I am inclined to think, however, that causes such as improved conditions of life and better nutrition of the masses of the people have had much to do with it.

SMALL-POX.

Since Jan. 30, 1893, the hospital at Field's Point has been kept open under the direction and at the expense of the committee on city property. On Feb. 20, 1894, an ordinance was approved which transferred this charge to the health department. The housekeeper was at that time paid $8 per week, she to furnish her own provisions, but the city to supply coal, wood, oil, etc. Previous to April 28 there had not been a case of small-pox in the city since April 15, 1892. On April 27, Dr. Gleason reported a suspicious case at No. 60 Unit street. The patient's name was Mary Burke, who lived in the lower tenement with her sister. Her married brother lived upstairs and had several children. Mary Burke was about 50 years old, born in Ireland, and had been vaccinated while an infant, in that country. She had not been vaccinated since. She worked in the Riverside mill until April 24, when she gave up on account of illness. She had not been away from home for a long time, nor had she received any letters or parcels from without the city. Her nephew, who lived upstairs, had returned about four weeks before from a wandering trip in the middle States, but so far as could be ascertained had not been exposed to small-pox. No exposure whatever could be traced in any way. The patient was seen in consultation with Dr. Leonard, who confirmed the diagnosis of small-pox, and she and her sister were at once removed to the Field's Point hospital. The sister, who was about 55 years old, had not been vaccinated since infancy, and was at once revaccinated by Dr. Gleason, with a N. E. Vaccine Co.'s point. She was vaccinated again on May 1, by Dr. Leonard, with humanized virus. Both vaccinations took and ran a normal course. Scarcely any one had been exposed to the patient before her removal. The kitchen and two bed-rooms, which were the only rooms infected, were disinfected by burning sulphur, by steaming all carpets, clothing, etc., and by washing floors, walls, ceilings and all furniture with corrosive sublimate. The rooms were then thoroughly aired for two weeks. The patient and her sister (who was not attacked by the disease) were discharged from the hospital June 1. Before leaving they had a complete bath in corrosive sublimate solution and an entire change of clothing. During the disinfection of their house and clothing, the wall and floor paper, and shoes, hats, etc., were destroyed to the value of $10, which was paid by the city.

On Wednesday, May 2, a suspicious case was reported by Dr. F. E. Peckham at 53 East George street. The patient was William P. Dillon, who was taken sick on April 30. On Friday, May 4, a consultation was held with Drs. Mitchell and Leonard, and he was at once removed in the ambulance to the Field's Point hospital. He was a mail clerk on the shore line train, and no exposure could be traced except the possible exposure to infected mail matter. His wife and

child, nine months old, and sister had been in close contact with him until the time of his removal. There had been little exposure of others. Mr. Dillon was 30 years old and had been vaccinated in infancy and never revaccinated.

His wife had been vaccinated in infancy. She and the child were vaccinated May 4, by Dr. Leonard, with humanized virus. The child had not before been vaccinated.

The patient died on May 12, the thirteenth day of his illness. The casket was furnished by an undertaker, but the body was prepared by the nurse and removed to the cemetery in the wagon belonging to the health department. Just before his death he was visited by the Rev. Fr. Kelly of St. Joseph's parish, who had been inoculated with small-pox in infancy. Dillon lived in an upper tenement, and there was a large amount of furniture, ornaments and clothing which were infected. A good deal of this was accidentally wet during disinfection, and was of such a nature that much of it was destroyed. The damage was estimated at $145.75, which was paid by the city. The rooms were fumigated with sulphur and cleaned in the usual way with corrosive sublimate.

While the above patient was being removed to the hospital the ambulance was overtaken by Dr. J. R. Morgan, who reported another case at the out-patient department of the Rhode Island Hospital. He was also taken in the ambulance at the same time. The patient's name was John O'Brien. He was twenty-six years old, and was, according to his statement, vaccinated when about six years old, at the city hall in this city.

He had probably been sick since April 29 or 30, but could not give a very clear account of himself, as he had been considerably under the influence of alcohol. For three nights he had slept in the What Cheer lodging house, 213 South Main street.

The out-patient department of the Rhode Island Hospital was disinfected with sulphur and corrosive sublimate. The lodging room was fumigated with sulphur, and the bed on which he slept was burned. A large number of persons had been exposed to him, some quite closely, at the Rhode Island Hospital, and they were almost all looked up and vaccinated. The attendants at the Rhode Island Hospital were also vaccinated. The lodgers at the lodging house nearly all refused to be vaccinated, being urged to this course by the proprietor. O'Brien undoubtedly contracted the disease at Bridgeport, Conn., where he had been about two weeks before he was attacked. Dr. Swarts, secretary of the State Board of Health, investigated the case and found that there had been eight cases of small-pox removed from the house next to where O'Brien had stayed, and that O'Brien had had intercourse with some of them. This patient rapidly improved, was out of bed in a few days, and was discharged from the hospital May 25.

On May 6, Dr. E. S. Allen reported a case at 290 Benefit street. The patient was a Swede girl, twenty-three old, a domestic. She had been vaccinated in infancy, and the cicatrices were very good. She said she had been vaccinated about ten years before, but there were no marks of it. The eruption appeared on the evening of May 5. She remained at the house until the morning of the 8th, when she was seen by Dr. Leonard, in consultation, who confirmed the

diagnosis of small-pox. She was at once removed to the hospital at Field's Point. The sleeping room and the kitchen where she had stayed most of the time while sick, were disinfected thoroughly in the usual manner, with corrosive sublimate, and the contents were either steamed or destroyed. All articles in other parts of the house which she was known to have come in contact with, were either steamed or destroyed. All parts of the house were fumigated with sulphur, three pounds to each 1,000 cubic feet of space. All persons who had come in contact with the patient were vaccinated. The patient rapidly improved and was discharged May 24.

On May 24, Dr. William H. Palmer reported a case at 719 North Main street. The patient was William Austin, fifty-eight years old. He said he was successfully vaccinated when about ten years old, but no cicatrix could be found. His family insisted that he had had small-pox at Newport when about four years old, but no pitting was visible. No information concerning his previous attack could be obtained in Newport. The patient had for four days been living in a cellar used for the sale of coal and wood, and when able he had been sawing kindlings. His whereabouts before that time could not be ascertained, but he had probably slept in sheds and lofts. When found the eruption appeared to be about the sixth day. He had slept in the same lodging house with O'Brien for the few nights the latter was there. So it seemed probable that this case was contracted from O'Brien. The patient was at once removed to the hospital in the ambulance belonging to the department. His clothing and a good deal of wood, barrels, etc., in the wood cellar were burned, and everything else in the cellar drenched with corrosive sublimate solution. The two men and the boy who worked in the same place were vaccinated, as were a number of other persons in the neighborhood who were known to have been exposed. The patient died June 1. The body was prepared by the attendants at the hospital and carried to the North Burial Ground in the department wagon by department employés.

When the patients were discharged they received a bath in corrosive sublimate, 1 to 1,000, or carbolic acid, 2 per cent., and put on an entire change of clothing which had not been in the hospital. They were then driven to their homes. While in the hospital they were allowed to communicate with their friends, but their letters were first disinfected by leaving them in a sterilizing oven until slightly brown. I attended the patients personally, but Drs. Leonard and Swarts saw them several times in consultation. As soon as the hospital was occupied by the patients a telephone was put in (the setting up being done by Mr. Rogers.) During the entire time no one entered the hospital except those mentioned and the attendants. The nurse in charge was Mrs. A. H. Warwick, who was from May 5 to June 9 assisted by Welcome Wilcox. Another nurse was there for a few days, from May 8 to May 11. As no storekeepers would deliver supplies, Walter J. Lewis was employed to buy provisions, ice, milk and other supplies, and carry them to the hospital daily. He was employed from May 5 to June 2, at $12 per week. The total expense to the city of the care of these patients and the disinfecting was $1,032.31. No other cases than those mentioned occurred.

DISINFECTION.

Disinfection after contagious disease in the city is not compulsory and is only done at the request of the family. It is done by this department without charge. The following are the number of disinfections since 1888:

Year.	Scarlet Fever.	Diphtheria.	Phthisis.	Cancer.	Small-Pox.	Typhus Fever.	Total.
1888....	....	....	....	....	....	....	180
1889....	....	....	....	....	....	....	92
1890....	....	....	....	....	....	....	93
1891....	....	....	....	....	....	....	132
1892....	101	28	....	2	6	3	140
1893....	158	8	4	2	....	1	173
1894....	331	56	1	....	12	....	400
Total..	590	92	5	4	18	4	1 210

Disinfection is done by carrying to the steam disinfector and there steaming all infected articles that can be so treated. In a considerable proportion of cases sulphur in large quantities is burned in the infected rooms, and the householder is instructed to thoroughly "clean house," using corrosive sublimate in all the water used for washing.

VACCINATION

During the year 1894 the number of persons vaccinated was 3,086 The only public vaccination has been at the city hall, Saturday afternoons. Humanized virus only is employed. The number of transfers in 1894 was 18, making the total number of transfers since 1868, when an accurate record was begun, 512. The number of certificates of vaccination issued was 2,809. The following table gives the number of persons vaccinated and the number of certificates issued from 1856 to 1880, and during each year since that time:

Year.	Persons Vaccinated.	Certificates Issued.
1856–1880	24,142	32,585
1881	2,307	1,655
1882	1,694	1,690
1883	1,385	1,601
1884	1,137	2,725
1885	17,034	1,776
1886	625	1,856
1887	917	1 437
1888	894	1,676
1889	1,136	1,344
1890	1,438	1,765
1891	1,738	2,112
1892	2.440	2,407
1893	1,905	2,359
1894	3,086	2,809
Total, 1856–1894	61,878	59,797

More persons were vaccinated in 1894 than in any year except 1885. This increase was doubtless due to the presence in the city of several cases of small-pox.

QUARANTINE.

The signal officer at quarantine for the year was John S. Adamson, who performed the services in a very satisfactory manner.

The following is the number of vessels hailed by the signal officer:

1893 (from May 18)	98
1894	82

The following is a list of the number of vessels boarded by the health officer, and the ports from which they sailed:

	1893.	1894.
British Provinces..	14	2
West Indies	11	14
Italy	1	2
Brunswick, Ga	3	0
South America	1	0
Total	30	18

SWILL.

During the year the swill has been collected by Messrs. A. H. and J. Barney, under contract with the city dated April 18, 1889. On the expiration of this contract, May 1, 1894, it was renewed for a period of five years from that date. The payment for the service is 15⅓ cents per annum for each person in the city, the population of the city to be estimated for that purpose each year by the city registrar. At this rate they were paid $1,937.50 each month during the year ending May 1, 1894, and $1,989.17 per month since that date.

The contractors continue to collect the swill in the same satisfactory manner in which they undertook the work. They employ in the business eighteen two-horse teams and one three-horse team.

VITAL STATISTICS FROM SOME OF THE PRINCIPAL CITIES OF THE UNITED STATES FOR 1894.

CITIES.	Population.	Total Deaths.	Deaths per Thousand.	Deaths Under One Year.	Percentage of Whole Number of Deaths.	Deaths Under Five Years.	Percentage of Whole Number of Deaths.	Deaths from Phthisis.	Percentage of Whole Number of Deaths.
New York	1,957,452	41,175	21.03	10,822	26.28	17,596	42.73	4,658	11.31
Philadelphia	1,139,457	22,680	19.90	......	......	......	......	2,513	11.08
Brooklyn	1,045,000	21,183	20.27	5,624	26.55	9,235	43.59	2,260	10.66
Cambridge	79,607	1,462	18.49	377	25.79	614	41.99	166	11.35
New Bedford	56,000	1,037	18.52	347	33.46	464	44.74	105	10.12
Taunton	26 954	575	21.33	104	18.09	180	31.30	71	12.35
Newton	28,837	437	15.22	116	26.54	168	38.23	31	7.09
Cleveland	325,000	5,663	17.42	1,644	29.03	2,806	49.55	402	7.09
Somerville	53,000	873	16.47	186	21.31	313	35.85	89	10.19
Haverhill	31,390	505	16.09	113	22.37	154	30.49	72	14.25
Jacksonville	30,000	561	18.70	154	27.45	199	35.47	109	19.43
Lynn	63,000	898	14.25	210	23.39	267	29.73	98	10.91
St. Louis	540,000	8,710	16.13	2 217	25.45	3,192	36.65	875	10.05
Newport	20,000	379	18.99	64	16.88	87	22.95	38	10.02
Cincinnati	325,000	5,945	18.29	1,299	21.85	2,018	33.94	720	12.11
Milwaukee	270,000	4,243	15.71	1,411	33.96	2,091	49.26	481	11.33
Kansas City	150,000	1,643	10.95	416	25.32	594	36.15	170	10.34
Yonkers	36,000	736	20.44	227	30.84	357	48.51	48	6.52
Richmond	81,388	1,720	21.13	422	24.53	580	33.76	231	13.43
Hartford	57 500	949	16.50	191	20.12	268	28.24	104	10.96
Columbus	100,000	1,308	13.08	291	22.24	429	32.78	194	14.83
Utica	50 000	942	18.84	178	18.89	253	26.86	75	7.96
Baltimore	455,427	9,486	20.83	2,616	27.67	3,761	39.65	1,106	11.76
Minneapolis	223,700	2,069	9.25	526	25.42	784	37.88	243	11.26
Boston	501,107	11,520	22.99	2,552	22.15	4,108	35.57	1,425	12.37
Knoxville	40,385	671	16.61	129	19.08	247	36.66	119	17.73
San Francisco	330,000	6,060	18.36	1,118	18.44	1,512	24.95	945	15.59
Portland, Ore	80 000	836	10.47	143	17.10	190	22.73	124	14.83
Oakland	60,000	711	11.83	126	17.72	178	25.03	111	15.61
Lowell	90,613	1,775	19 58	511	30.48	751	42.31	192	10.82
St. Paul	155,000	1,570	10.13	501	31.91	743	47.32	88	5.60
Jersey City	180,000	6,338	35.21	......	......	2,749	44.09	593	9 36
Grand Rapids	80,000	1,033	12 91	218	21.10	126	12.19	134	12.97
Reading, Pa	72,000	1,497	20.79	334	22 31	519	34.66	106	7.08
Fall River	89,773	2,028	22.59	793	39.10	298	14.69	139	6.85
Atlanta Ga	100,000	1,638	16.38	309	18.86	212	12.94	238	14 52
Charleston, S. C.	55,165	1,779	32.24	392	22.03	251	14.10	224	12.59

VITAL STATISTICS FROM SOME OF THE PRINCIPAL CITIES OF THE UNITED STATES FOR 1894.

Deaths from Typhoid Fever.	Percentage of Whole Number of Deaths.	Deaths from Scarlet Fever.	Percentage of Whole Number of Deaths.	Deaths from Diphtheria.	Percentage of Whole Number of Deaths.	Deaths from Small-pox.	Percentage of Whole Number of Deaths.	Deaths from Diarrhœal Diseases.	Percentage of Whole Number of Deaths.	CITIES.
326	.79	541	1.31	2,359	5.73	154	.37	3,216	7.81	New York.
369	1.62	153	.67	1,047	4.61	13	.06	3,016	13.29	Philadelphia.
158	.74	188	.88	1,279	6.04	22	.10	1,771	8.36	Brooklyn.
23	1.57	101	6.91	56	3.83	0	0	171	11.69	Cambridge.
13	1.25	19	1.83	10	.96	0	0	93	8 97	New Bedford.
5	.87	2	.35	50	8.69	0	0	42	7.30	Taunton.
10	2.29	4	.91	20	4.58	0	0	35	8.01	Newton.
89	1.57	338	5.97	107	1.92	3	.05	671	11.85	Cleveland.
13	1.49	51	5.84	28	3.21	0	0	70	8.02	Somerville.
7	1.38	2	.39	4	.79	0	0	34	6.73	Haverhill.
8	1.42	0	0	2	.35	0	0	35	6.24	Jacksonville.
12	1.34	8	.89	20	2.23	1	.11	78	8.68	Lynn.
171	1.96	29	.33	240	2.75	0	0	980	11.25	St. Louis.
10	2.64	1	.26	5	1.32	0	0	25	6.59	Newport.
169	2 84	11	.18	200	3.37	0	0	298	5.01	Cincinnati.
70	1.65	12	.28	165	3.88	244	5.79	470	11.08	Milwaukee.
25	1.52	1	.06	50	3.04	0	0	78	4.74	Kansas City.
4	.54	1	.13	88	11.95	1	.13	103	13 99	Yonkers.
28	1.63	1	.06	2	.11	0	0	122	7.09	Richmond.
28	2.95	3	.31	19	2.00	0	0	77	8.11	Hartford.
52	3.97	10	.76	43	3.28	2	.15	77	5.89	Columbus.
7	.74	0	0	22	2.33	1	.10	51	5.41	Utica.
222	2.35	85	.89	200	2.11	0	0	745	7.85	Baltimore.
181	8.71	59	2.85	54	2.61	0	0	124	5.99	Minneapolis.
141	1.22	192	1.66	817	7.09	22	.19	761	6.60	Boston.
23	3.43	2	.29	3	.45	0	0	49	7.30	Knoxville.
114	1.88	14	.23	38	.62	0	0	280	4.62	San Francisco.
18	2.15	5	.59	10	1.19	0	0	40	4.78	Portland, Ore.
12	1.69	1	.14	9	1.26	0	0	17	2.39	Oakland.
50	2.82	16	.90	14	.79	3	.17	257	14.48	Lowell.
32	2.04	22	1.40	61	3.88	1	.06	136	8.66	St. Paul.
137	2.18	56	.88	222	3.50	1	.02	383	6.04	Jersey City.
36	3.48	8	.77	17	1.64	0	0	81	7.84	Grand Rapids.
33	2.20	6	.40	76	5.07	0	0	115	7.68	Reading, Pa.
33	1.62	7	.34	17	.83	0	0	280	13.80	Fall River.
50	3.05	8	.48	5	.30	3	.18	176	10.74	Atlanta, Ga.
24	1.34	3	.16	2	.11	0	0	142	7.98	Charleston, S. C.

STATISTICS OF THE CITY OF PROVIDENCE.

The estimated population for July 1, 1895, is 158,000.
Area, square miles, 16.25.

ASSESSED VALUATION.

	1893.	1894
Real estate	$119,001,700	$126,463,800
Personal estate	40,810,860	40,800,400
Total	$159,812,560	$167,264,200
Rate of tax	$1.60 per $100	
Total amount of all tax	$2,557,000.96	$2,676,227.20

Miles of water pipes	272.88	284.76
Number of service pipes in use	17.417	18,152
Number of meters in use	12,088	13.153
Average daily consumption of water	9,128,563 gals	9,904,434 gals.
Miles of sewers	129.71	141.747
Number of sewer connections	9,442	10,587

EXPENSES OF THE HEALTH DEPARTMENT.

The amount appropriated for the fiscal year ending Sept. 30, 1895. was $43,000.

Salary of superintendent of health	$2,000 00
Removal of swill	23,5 8 35

1. SCITUATE.

2. S. B. Smith, health officer.

3. There have been no epidemics during the past year.

6. I was called to view a nuisance at Richmond village, and found that the people occupying the upper part of the stone tenements were in the habit of throwing their slops, garbage, etc., across the walk, making it in a very bad condition. I notified the owner, but to the best of my knowledge nothing has been done.

9. All public nuisances, unsanitary premises, etc., are reported to the town council.

10. There has been, to my knowledge, no contamination of the water, milk or ice supplies of this town.

11. To the best of my knowledge there are no ice dealers in this town. There is probably one in Hope.

1. SMITHFIELD.

2. Jencks Smith, health officer.

3. There have been no epidemics during the past year. The contagious diseases were all in Georgiaville and were as follows: Diphtheria, one case in November; and scarlet fever, one case in December. No deaths were reported in either instance.

4. Isolation was not maintained.

5. None of the sick were isolated.

6. No inspection of premises, where sickness prevailed, was made.

7. No sanitary inspections were made during the past year.

8. No unhealthy localities in this town are known.

9. All public nuisances, unsanitary premises, etc., are reported to the town council.

10. There has been, to my knowledge, no contamination of the water, milk or ice supplies of this town.

11. William Winsor is the ice dealer of this town.

1. WOONSOCKET.

2. A. M. Paine, M. D., J. C. Molten, and Joseph Jallent are the health officers.

3. There have been no epidemics during the past year.

6. There has been no special reason why sanitary inspections should be made.

7. Inspections of water closets, cesspools, sink drains, etc., were made at my own option and from private complaints, and all nuisances were ordered abated, when any such were found.

8. No unhealthy localities in this city are known.

9. All public nuisances, unsanitary premises, etc., are reported to the board of aldermen.

10. There has been, to my knowledge, no contamination of the water, milk or ice supplies of this city.

11. The Woonsocket Coal and Ice Co , G. W. Miller, and A. J. Kelly are the ice dealers of this city.

WASHINGTON COUNTY.

1. CHARLESTOWN.

2. Albert A. Saunders, M. D., health officer.

3. There have been no epidemics during the past year.

6. No inspection was made of cellars, sink drains, etc.

7. No sanitary inspections were made during the past year.

8. No unhealthy localities in this town are known.

9. All public nuisances, unsanitary premises, etc., are reported to the town council.

10. There has been, to my knowledge, no contamination of the water, milk or ice supplies of this town.

11. John C. Tucker, of Carolina, is the ice dealer of this town.

1. EXETER. Has no health officer.

1. HOPKINTON.

2. G. A. Langworthy, health officer.

3. There have been no epidemics during the past year. La Grippe was prevalent all over the town during December. The contagious diseases, which all occurred in December, were as follows: Typhoid fever, two cases each in Rockville and Wyoming, from which one death was reported, and one case of measles.

4. Isolation was maintained.

5. All of the sick were isolated.

6. Inspection of premises, where sickness prevailed, was made, but no cause was known to the physician, who informed me that every precaution was taken to prevent the spread of the contagion.

7. No sanitary inspections were made during the past year, as no cases of nuisances were reported.

8. No unhealthy localities in this town are known.

9. All public nuisances, unsanitary premises, etc., when any such come to my knowledge, are reported to the town council.

10. There has been, to my knowledge, no contamination of the water, milk or ice supplies of this town.

11. William L. Clarke, of Ashaway, H. G. Kenyon, of Hopkinton, and B. F. Smith, of Hope Valley, are the ice dealers of this town.

1. NARRAGANSETT DISTRICT.

2. Lewis A. Champlin, health officer.

3. There were no epidemics during the past year.

1. NORTH KINGSTOWN.

2. Lance de Jough, health officer.

3. There were no epidemics during the past year. The contagious diseases were as follows: Scarlet fever, one case in Allenton; typhoid fever, eight cases in Wickford and Lafayette. These cases all occurred from June to September, but no deaths were reported from either disease.

4. Isolation was maintained only in the scarlet fever case.

6. In one of the typhoid cases inspections were made and the sanitary conditions were found to be good, but in the other cases the cesspools were in a somewhat untidy condition, and the well water was not pure.

7. A number of wells, cesspools and privies were inspected, and when found to be impure were ordered to be cleaned and disinfected.

8. In the centre of the village of Wickford, and in one or two spots in the other villages, the sanitary conditions are not good, although the health of those living there has not been impaired.

9. I have made no reports of public nuisances, unsanitary premises, etc., all those are within the jurisdiction of the truant officer.

10. There has been, to my knowledge, no contamination of the water, milk or ice supplies of this town.

11. James B. Brayman, W. George Orpin, and Daniel Spink, of Duck Cove Farm, are the ice dealers of this town.

1. RICHMOND.

2. John L. Kenyon, health officer.

3. There were no epidemics during the past year. The contagious diseases reported were as follows: Eight cases of scarlet fever in the Wood River Mills, during November and December. No deaths were reported.

4. Isolation was maintained.

5. All of the sick were isolated.

6. The outbreak of the disease was caused by a case of scarlet fever brought from White Rock.

7. No sanitary inspections were made during the past year.

8. No unhealthy localities in this town are known.

9. All public nuisances, unsanitary premises, etc., are reported to the town council.

10. There has been, to my knowledge, no contamination of the water, milk or ice supplies of this town.

11. Samuel L. Richmond and John Smith of Hopkinton are the ice dealers of this town.

1. South Kingstown.

2. F. C. Gould, health officer. No report received.

1. Westerly.

2. Ethan Wilcox, superintendent of health. Benjamin York, health officer.

3 There were no epidemics during the past year.

7. Sanitary inspections were made as needed. Sometimes by the superintendent, and sometimes by the health officer.

8. No unhealthy localities in this town are known.

9. All public nuisances, unsanitary premises, etc., are reported to the town council.

10. There has been, to my knowledge, no contamination of the water, milk and ice supplies of this town.

11. Lorenzo D. Richmond and Horace Vose are the ice dealers of this town.

METEOROLOGY.

It has been remarked in previous reports of the Board that the influence of the meteorological conditions of the atmosphere, as well as the floating matter suspended therein, are recognized and acknowledged by all pathologists as causes of disease; and the following tables are therefore introduced, as heretofore, for the purpose of comparing the large prevalence of certain diseases at different monthly periods of the year, with the temperature, the atmospheric pressure, the relative humidity, prevailing direction and force of the wind and other conditions of the atmosphere, and also the amount of cloud and rainfall during each month of the year. All of the said diseases and monthly prevalence of the same may be found in the report upon the registration of deaths arranged by MONTHS, in Table VII of the Registration Report.

The first table is compiled from the monthly reports of the City Engineer of Providence, and shows the mean, maximum and minimum temperature of the different months, and the extremes and average daily range of the same, the rainfall and prevailing direction of the wind.

The second table will give a more comprehensive monthly summary of observations during 1894, including a large number of atmospheric conditions for each month, and also yearly summaries for each of the thirteen preceding years.

It is condensed from the annual summary of monthly observations at Hope Reservoir and the City Hall, in Providence.

TABLE I.

Temperature, Range of Temperature, Rainfall and Prevailing Direction and Velocity of the Wind, for each Month during the year 1894.

MONTHS, 1894.	TEMPERATURE. Mean.	Maximum.	Minimum.	Range.	Greatest Daily Range.	Least Daily Range.	Average Daily Range.	Total Amount of Rain or Melted Snow in inches.	Prevailing Direction of Wind.	Mean Velocity.
January......	31.1	56.5	5	51.5	31.5	6.5	28.	4.14	N. & N. W.	8
February.....	27.5	49.	4.	53	34.0	4.	40.5	4.55	N. & N. W.	10
March........	42.9	66.	20.	46.	25.5	6.5	30.8	1.33	S.	8
April.........	47.6	74.5	22.5	52	27.5	4.	28.3	3.72	N. & S.	10
May...... ...	59.8	88.	42.	46.	29.5	9	25.5	5.04	S. & N. W.	8
June....	70.2	95.5	47.5	48.	35	10.5	27.	.56	S. & S. W.	8
July..........	76.	97	56.5	40.5	25.5	14	21.6	1.77	S. W. & S.	7
August.... ..	69.8	88.	48.5	39.5	27.5	7.5	18.3	2.14	N. & S. W.	6
September ...	66.5	84.5	43.5	41	26.	7	21.8	3.09	S. W. & N. W.	6
October......	54.5	71.5	39.5	32.	24.5	4	19.6	6.79	N. W., W. & N. E.	8
November....	38.6	64.5	16.5	48.	26.5	3.5	36.1	3.52	N. W. & W.	9
December ...	32.8	54.5	7.5	47.	30.5	5.	37.5	5.62	N. W. & N.	7

TABLE II.—*Summary of Meteorological Observations at Hope Reservoir and City Hall, for the Year 1894.*

MONTHS.	Barometer, Reduced to Sea Level, and to 32°.				Thermometer.				Relative Humidity.	Wind. Prevailing Direction No. of days it was.									Wind.	Weather. Atmosphere. No. of days it was.					Weather.	Rain and Snow.	
	Mean.	Maximum.	Minimum.	Range.	Mean.	Maximum.	Minimum.	Range.	Mean.	N.	N. E.	E.	S. E.	S.	S. W.	W.	N. W.	Variable.	Mean Velocity.	Clear.	Fair.	Variable.	Rain or Snow.	All others.	Mean Amount of Cloud.	Amount of Rain or Melted Snow in inches.	Depth of Snow in inches.
January.........	30.08	30.66	28.78	1.88	31.1	56.5	5.	51.5	78	9	0	2	0	3	3	4	6	4	8	6	7	2	16	0	5.1	4.14†	19.50
February..........	30.07	30.78	29.08	1.70	27.5	49.	—4.	53.	75	6	1	1	2	1	2	0	6	9	10	4	10	0	14	0	5.3	4.55†	25.00
March.............	30.04	30.50	29.46	1.04	42.9	66.	20.	46.	71	4	0	1	0	11	0	5	4	6	8	3	13	0	15	0	4.4	1.33†	2.50
April.............	29.98	30.44	29.61	.83	47.6	74.5	22.5	52.	68	7	3	0	2	6	3	2	4	3	10	2	13	0	15	0	5.1	3.72†	11.00
May...............	29.94	30.41	29.51	.90	59.8	88.	42.	46.	72	3	1	2	4	5	2	2	4	8	8	5	11	0	15	0	5.0	5.04	......
June..............	29.95	30.26	29.55	.71	70.2	95 5	47.5	48.	72	1	3	0	0	7	6	4	2	7	8	1	13	0	12	4	5.0	.56	......
July..............	29.97	30.25	29.71	.54	76.	97.	56.5	40.5	71	2	0	1	0	7	9	1	3	8	7	2	18	1	10	0	4.3	1.77	......
August............	29.99	30.17	29.75	.42	69.8	88.	48.5	39.5	74	5	1	1	1	3	5	2	3	10	6	2	15	1	7	6	4.7	2 14	......
September.........	30.08	30.55	29.62	.93	66.5	84.5	43.5	41.	77	1	3	3	1	3	5	2	4	8	6	1	12	2	8	7	5.6	3.09	......
October...........	29.94	30.36	29.13	1.23	54.5	71.5	39.5	32.	75	1	5	2	0	4	4	5	7	3	8	6	7	4	14	0	4.8	6.79	......
November..... ...	30.00	30.64	29.25	1.39	38.6	64.5	16.5	48.	72	4	1	1	0	2	4	6	9	3	9	8	7	0	15	0	4.7	3.52†	8.00
December..........	30.06	30.44	29.25	1.19	32.8	54.5	7 5	47.	72	8	2	1	0	2	2	3	9	4	7	6	8	4	12	1	4.3	5.62†	11.00
Means for the year.	30.01	......	......	1.06	51.4	......	......	45 4	73	..	..	..	..	..	..	..	..	..	8	....	....	...	....	....	4.9	....	......
Totals for the year.	.....	.....	......	......	......	......	......	......	....	51	20	15	10	54	45	36	61	73	...	46	134	14	153	18	..	42.27	77.00
Extremes	......	30.78	28.78	2.00	......	97.	—4.	101.	....	..	..	..	..	..	..	..	..	..	....	....	....	....	....	....	...	....	......

† Rain and snow.

Yearly Summary for 1893.

Means for the year.	29.98			1.13	48.6			44.8	73										9						4.8		
Totals for the year.										57	15	9	13	45	32	33	72	89		53	138	5	166	3		51.28	80.50
Extremes		30.81	28.84	1.97		95.5	0.	95.5																			

14

Yearly Summary for 1892.

Means for the year.	29.98			1.06	50.4			43.3	71										8						4.9		
Totals for the year										50	19	8	10	41	38	52	75	73		47	147	9	156	7		37.39	43.00
Extremes		30.65	28.99	1.66		96.	2.	94.																			

Yearly Summary for 1891.

Means for the year.	30.02			1.10	51.7			46.8	74										8						5.1		
Totals for the year.										46	24	8	11	63	40	26	73	74		37	158	7	158	5		53.19	31.25
Extremes		30.78	28.81	1.97		98.	6.	92.																			

Yearly Summary for 1890.

Means for the year.	30.00			1.00	50.4			45.4	74										9						5.4		
Totals for the year.										52	15	6	13	47	32	43	79	78		37	151	7	168	2		50.60	42.00
Extremes		30.88	29.23	1.65		96.	5.5	90.5																			

Yearly Summary for 1889.

Means for the year.	29.99			1.15	51.4			42.3	76										8						5.4		
Totals for the year.										56	31	9	7	61	39	37	71	54		40	142	9	166	8		55.91	17.75
Extremes		30.90	28.93	1.97		92.5	0.5	92.																			

TABLE 11.—Continued.—*Summary of Meteorological Observations at Hope Reservoir and City Hall.*

Yearly Summary for 1888.

MONTHS.	BAROMETER, Reduced to Sea Level, and to 32°.				THERMOMETER.				Relative Humidity.	WIND. Prevailing Direction. No. of days it was.										WEATHER. Atmosphere. No. of days it was.						RAIN AND SNOW.	
	Mean.	Maximum.	Minimum.	Range.	Mean.	Maximum.	Minimum.	Range.	Mean.	N.	N. E.	E.	S. E.	S.	S. W.	W.	N. W.	Variable.	Mean Velocity.	Clear.	Fair.	Variable.	Rain or Snow.	All others.	Mean Amount of Cloud.	Amount of Rain or Melted Snow in inches.	Depth of Snow in inches.
Means for the year.	30.00	......	......	1.21	48.2	......	......	46.5	72	..	..	..	.	.	..	..	..	..	9	...	. .	....	.. .	....	5.2	....	......
Totals for the year.	......	......	......	......	......	......	......	......	....	54	17	9	11	41	33	34	97	70	....	54	137	3	167	5	....	63.44	31.50
Extremes...........	......	30.82	28.75	2.07	......	96.5	—5.	101.5	....	..	..	..	..	..	..	..	..	..	....	....	....	....	....	....	....	....	......
Yearly Summary for 1887.																											
Means for the year.	30.01	......	.....	1.26	49.4	.....	.....	47.	73	..	..	..	..	..	..	..	..	..	8	. ..	....	...	....	....	5.2	....	......
Totals for the year.	......	......	......	......	......	.....	.....	......	....	63	22	7	14	45	38	26	77	73	...	35	147	14	154	15	. ..	50.98	54.00
Extremes...........	......	30.97	28.94	2.03	......	94.	—1.5	95.5	....	..	..	..	..	..	..	..	..	..	...	....	....	....	....	....	....	....	......
Yearly Summary for 1886.																											
Means for the year.	30.01	......	......	1.13	48.8	......	......	46.8	74	..	.	..	..	..	..	..	..	..	8	....	....	....	..	....	5.0	.... ..	......
Totals for the year.	......	......	......	......	......	......	......	....	....	51	27	12	7	56	30	39	69	74	...	34	143	18	160	10	....	52.02	54.50
Extremes...........	......	30.80	28.69	2.11	......	95.5	—5.5	101.	....	..	..	..	..	..	..	..	..	..	.. .	....	....	....	....	....	....	....	......

Yearly Summary for 1885.

Means for the year.	29.98			1.09	48.7			46.6	71										9						4.6		
Totals for the year.										46	21	8	14	56	43	42	74	61		45	157	17	142	4		39.70	27.25
Extremes		30.82	28.99	1.83		93.5	−1.	94.5																			

Yearly Summary for 1884.

Means for the year.	30.01			1.05	49.5			49.2	76										9						5.3		
Totals for the year.										57	22	8	14	42	60	27	63	73		36	127	26	166	11		48.76	44.50
Extremes		30.79	28.93	1.86		94.	−10.	104.																			

Yearly Summary for 1883.

Means for the year.	30.05			1.08	48.2			45.5	72										2.2						5.1		
Totals for the year.										43	31	7	11	44	51	35	70	73		45	136	17	156	11		39.54	73.00
Extremes		30.77	28.88	1.89		93.	−9.5	102.5																			

Yearly Summary for 1882.

Means for the year.	30.03			1.03	49.2			46.	72										2.2						5.3		
Totals for the year.										54	26	2	16	46	39	40	82	60		44	148	31	136	6		44.96	74.00
Extremes		30.79	29.22	1.57		95.	−11.	106.																			

Yearly Summary for 1881.

Means for the year.	30.00			1.08	49.6			44.5	73										2.15						5.1		
Totals for the year.										47	33	12	9	50	47	20	80	67		80	73	54	130	28		44.79	27.50
Extremes		30.80	28.97	1.83		96.	4.	100.																			

The force of the wind and amount of cloud are closely approximated in figures from 0 to 10. The rainfall observations previous to 1886 have been corrected for an inaccuracy caused by the imperfect construction of the gauges with which they were made.

Condensed Table of Meteorological Observations in Rhode Island, 1881-1894.

YEARS.	Barometer Reduced to Sea Level and to 32° F.				Thermometers.				Humidity.	Precipitation.		Wind.
	Mean Barometer.	Highest Barometer.	Lowest Barometer.	Mean Range of Barometric Pressure.	Means.	Maximum.	Minimum.	Mean Range.	Mean Humidity.	Rain and Melted Snow in inches.	Number of Days Snow or Rain fell.	Prevailing Direction of.
1894	30.01	30.78	28.78	1.06	51.4	97.	—4.	45 4	73	42.27	153	Variable.
1893	29.98	30.81	28.84	1.13	48.6	95.5	0.	44.8	73	51.28	166	N. W.
1892	29.98	30.65	28.99	1.66	50.4	96.	2.	43.3	71	37.39	156	N. W.
1891	30.02	30.78	28.81	1.10	51.7	98.	6.	46.8	74	53.19	158	N. W.
1890	30.00	30.88	29.23	1.00	50.4	96.	5.5	45.4	74	50.60	168	N. W.
1889	29.99	30.90	28.93	1.15	51.4	92.5	0.5	42.3	76	55.91	166	N. W.
1888	30.00	30.82	28.75	1.21	48.2	96.5	—5.	46.5	72	63.44	167	N. W.
1887	30.01	30.97	28.94	1.26	49.4	94.	—1.5	47.	73	50.98	154	N. W.
1886	30.01	30.80	28.69	1.13	48.8	95.5	—5.5	46.8	74	52.02	160	Variable.
1885	29.98	30.82	28.99	1.09	48.7	93.5	—1.	46.6	71	39.70	142	N. W.
1884	30.01	30.79	28.93	1.05	49.5	94.	—10.	49.2	76	48.76	166	Variable.
1883	30.05	30.77	28.88	1.08	48.2	93.	—9.5	45.5	72	39.54	156	Variable.
1882	30.03	30.77	29.22	1.03	49.2	95.	—11.	46.	72	44.96	136	N. W.
1881	30.00	30.80	28.97	1.08	49.6	96.	—4.	44.5	73	44.79	130	N. W.

BIRTHS, DEATHS AND MARRIAGES.

1894.

The value of reliable reports in their various bearings, relating to the records of births, marriages and deaths and the items of fact connected therewith, showing the vital movements of the population from year to year, has been so frequently presented in the previous reports of this Board as to need no repetition at this time. It is gratifying, however, to be able to state that, with no exception, persons eminent in social and political science everywhere, recognize the indispensable information such reports furnish, and that in every civilized country they occupy places of importance in the government reports scarcely second to any other department.

The Forty-first Report on the registry of vital movements in Rhode Island was completed and issued by the end of the year, and will be found appended to this report.

The work of collecting the data for the Forty-second Report, the enumerating, classifying, arranging and collecting in tables for the purpose of presenting the various facts in such detail as to facilitate examination and study, has been in progress during the time of making up this report, and affords some facts which may be presented at this time.

Below will be found some of the general results of the registry of births, marriages and deaths during 1894:

BIRTHS.

SEX.		PARENT NATIVITY.	
Males	5,129	Native*	4,194
Females	4,856	Foreign	5,791

Whole number of births ... 9,985

* Including all whose fathers were born in the United States, whether the fathers were of foreign parentage or of native.

MARRIAGES.

Native born Groom and Bride	1,539
Foreign born Groom and Bride	1,043
Native Groom and Foreign Bride	337
Foreign Groom and Native Bride	352
Whole number of marriages	3,271

Native Grooms	1,876	Foreign Grooms	1,395

DEATHS.

SEX.		PARENTAGE.	
Males	3,559	Native	3,055
Females	3,601	Foreign	4,091
		Unknown	14

Whole number of deaths 7,160

There was one birth to every 37.6 of the population, or .... 26.6 births in every 1,000

One person married in every 57.4 of the population, or .... 17.4 persons married in every 1,000

And one death in every 51.0 of the population, or .... 19.5 deaths in every 1,000

Estimated population for 1894—375,386.

The following summary will show the rates, per 1,000 of the population, of births, marriages and deaths, for twelve years.

	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892	1893	1894
Birth-rates.......... ...	24.4	23.9	23.1	24.5	24.2	24.2	24.1	24.7	26.5	25.2	26.5	26.6
Death-rates............	18.1	17.1	17.7	18.8	19.9	20.4	19.0	20.1	18.6	20.1	19.6	19.5
Excess of Birth-rates over Death-rates....	6.3	6.8	5.4	5.7	4.2	3.8	5.1	4.6	7.9	5.1	6.9	7.1
Marriage-rates,—persons married.	18.5	17.2	16.3	17.7	18.0	18.7	18.4	18.5	18.7	19.1	18 7	17.4
Ratio of number of marriages	9.3	8.6	8.2	8.8	9.0	9.3	9.2	9.3	9.3	9.6	9.9	8.7

The following table will present the number, parentage, and proportion to total mortality of deaths from several of the most prominent causes of death in their order of precedence:

	Whole No. of Deaths.	Percentage of Deaths from all Causes.	Parentage. Native.	Foreign and Unknown.	Excess of Foreign over Native.
Consumption	774	10.81	258	516	258
Pneumonia	665	9.29	305	360	55
Cholera Infantum	496	6.93	162	334	172
Heart Disease	476	6.65	246	230	—16
Apoplexy	415	5.80	220	195	—25
Kidney Diseases	312	4.36	163	149	—14
Brain Diseases	282	3.94	126	156	30
Bronchitis	254	3.55	82	172	90
Accidents	233	3.25	74	159	85
Cancer	214	2.99	121	93	—28
Old Age	187	2.61	109	77	—32
Diphtheria	133	1.86	61	72	11
Scarlatina	123	1.72	52	71	19
All causes	7,160	100	3,017	4,101	1,054

LONGEVITY OF DECEDENTS.

	1894.	1893.	1892.	1891.	1890.	1889.
Average age in years of Male decedents.	32.47	30.97	32.96	31 70	31.04	32.20
Female "	34.40	33.99	37.75	36.28	34.26	35.75
Total "	33.44	32.46	35.34	34.47	32.62	34.00

There has been a gradual increase during the last thirty years in the average length of life of decedents, taking periods of five years each and a last period of three years, running from about twenty-nine and three-fourths years at the beginning, to thirty-three and two-thirds years at the ending in 1894.

PERCENTAGE OF MORTALITY BY CLASSES.

	1894.	1893.	1892.	1891.	1890.	1889.
Zymotic diseases	22.02	22.89	24.97	23.11	25.38	22.08
Constitutional diseases	16.06	16.04	16.50	17.73	18.48	18.61
Local diseases	46.18	46.13	41.89	42.31	40.15	42.10
Developmental diseases	10.92	9.74	11.39	11.77	10.89	12.04
Violence, etc	4.82	5.20	5.25	5.08	5.10	5.17

The large increase of percentage in the class of local diseases up to 1894 was due to the increase in the number of deaths from pneumonia,

the greatest number of deaths being due to this cause in 1893, there being 121 more than in 1892, and 208 more than in 1891. There were 111 less deaths from pneumonia in 1894 than in 1893.

RATIOS OF MORTALITY.

As compared with the year 1893, there was considerable change in 1894, in the proportional mortality of several of the most important diseases occurring in larger or smaller numbers every year.

Apoplexy and Paralysis.—The deaths from these diseases were nearly the same in each of the years, 338 in 1892 and 335 in 1891. In 1893 these had increased to 407. In 1894 to 415.

Bronchitis.—The deaths from bronchitis were 61 less than in the previous year. There has been a steady increase in the proportionate mortality from bronchitis during the last twenty years previous to 1894, which must be attributed to something more than increased skill in differential diagnosis.

Cancer.—The deaths from cancer were 214 in 1892, 205 in 1893 and 181 in 1892. Cancer has increased slightly in its proportion of mortality to whole number of causes of death, during the last twenty-five years, and is probably due to increased facilities in diagnosis.

Cholera Infantum.—There were 496 deaths from cholera infantum in 1894, 603 deaths in 1893 and 633 in 1892. The proportion to whole number of deaths was 6 93 per cent. For the last 29 years it has been about 7 per cent.

Consumption.—As a cause of death, returned under the name consumption, there were 774 cases. Owing to a constant change of nomenclature applied to this condition, reports are variously returned under other names. There should therefore be included under this heading: Consumption, 39 cases; pulmonary consumption, 97; phthisis, 20; phthisis pulmonalis, 395; tuberculosis, 13; general tuberculosis, 61, and tuberculosis pulmonalis, 149, making a total of 774 deaths from pulmonary tuberculosis, the name which should now be applied to this condition as accepted by registration reports generally. Added to this there were 39 deaths from tubercular meningitis, 5 from fibroid phthisis, 1 from tubercular arthritis, 5 from tubercular laryngitis and 3 from tubercular peritonitis.

There were 52 more deaths from consumption in 1894 than in 1893, and they were 10.81 per cent. of all causes. The percentage has been

decreasing for the past four years previous to 1894, and materially so from the percentages of the last 28 years; and this with the improved methods of diagnosis and an increased population is an encouragement.

As will be seen by the table on page 138, consumption stands highest on the list as a cause, pneumonia being second. Consumption was the cause in 10.81 per cent. of all causes, and pneumonia 9.28 per cent.

A decided contrast will be seen in the proportion of the different diseases, by observation of the diagram shown on page 116. Here, considering the conditions for 30 years, it will be seen that pulmonary tuberculosis has exceeded pneumonia nearly 100 per cent. as a cause. In 1893 there were more deaths from pneumonia than from pulmonary tuberculosis.

Diarrhœa and Dysentery.—The mortality from these diseases was 35 less in number than in the previous year, or 124 in 1894, 159 in 1893 and 199 in 1892, but in proportion to entire mortality in 1894, they were a little less than one-half of one per cent. less than in 1893.

Diphtheria.—This disease had a mortality of 133 in 1894, which was 24 less than in 1893; 113 of these were in Providence county, 47 being in Providence city; the percentage to the whole number of deaths was 1.86. In 1893 it was 2.11, in 1892 it was 1.20, but in 1890 it was 3.04 and in 1887 it was 11.56.

Fevers, Malarial.—These had a mortality of 14 in 1894 and 20 in 1893, a decrease of 30 per cent.

Fever, Typhoid.—There were 159 deaths from typhoid fever in 1894, being 44 more than in 1893. Typhoid fever as a disease and as a cause of death, up to 1894, has gradually lessened in both proportions as compared with other important diseases during the previous fifteen years.

Heart, Diseases of.—The deaths from diseases of the heart numbered 476 as against 535 in 1893. Diseases of this organ have, however, been gradually increasing during the last thirty years. See Table LXXVIII, page 209, Reg. Rep.

Influenza.—The number of deaths reported as from this disease in 1894 was 166, 81 more than in 1893. During the epidemic of 1892 there were 336 deaths from this cause.

Kidneys, Diseases of.—The number of deaths from diseases of the kidneys in 1894 was 312, the number in 1893 was 302. Diseases of these organs have been gradually assuming large importance as causes

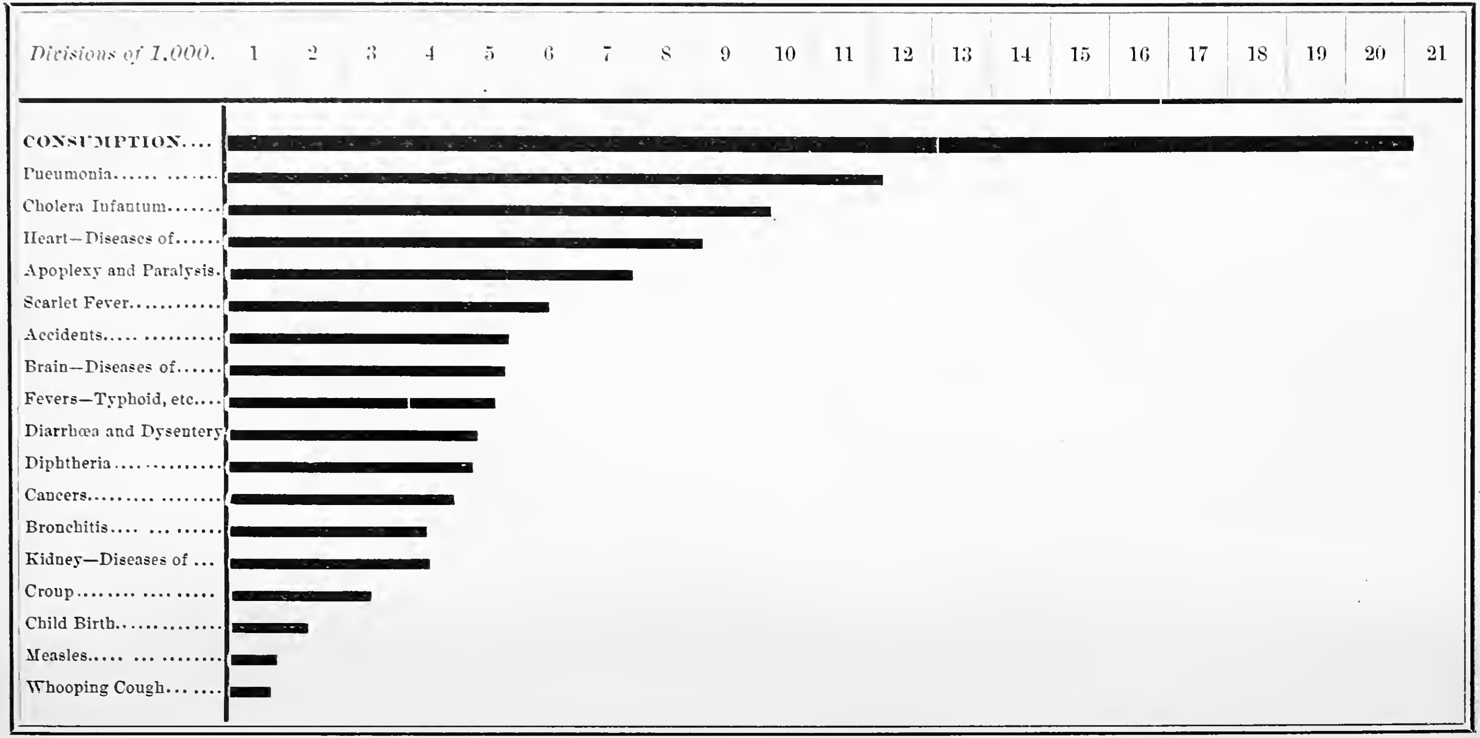
of death during the last twenty-five years. The ratio of mortality for five years, 1885–89, was nearly four times as large as the ratio for the years 1865–69, and of 1890–94 more than four and one-half times as large. See Table LXXXI, page 216, Reg. Rep.

Pneumonia.—The number of deaths caused by pneumonia in 1894 was 665 as against 776 in 1893. Pneumonia has gradually increased in importance as a cause of death for the last fifteen years previous to 1894. See Reg. Rep., Table LXXXVI, page 226.

Scarlatina.—The number of deaths was 123, 70 less than in 1893. The proportion was 1.72 per cent. of the whole number of deaths. Scarlatina has largely decreased in epidemic prevalence and proportion of mortality during the last fifteen years, as compared with previous periods of fifteen years each.

Small-pox.—There were two deaths from small-pox in 1894, there being none the year previous and four in 1892. The diminution of cases and the decrease of mortality as a consequence, has been quite remarkable during the last fifteen years. The efficacy of vaccination has had remarkable endorsement.

DIAGRAM EXHIBITING THE COMPARATIVE MORTALITY BY ABSOLUTE NUMBER OF DEATHS FROM EIGHTEEN PRINCIPAL CAUSES OF DEATH IN RHODE ISLAND FOR THIRTY-EIGHT YEARS, 1865-1894.



WATER SUPPLIES.

WATER SUPPLIES.

As set forth in the annual report to the governor of the state, the desirability of an intelligent control of the drinking water of the state was considered to be of the utmost importance.

"This control should include the inspection of the source of supply of all river waters, used by cities or towns for drinking water, whether under the control of the town or when supplied by a private corporation. The supplies so freely sold by different dealers and taken from various private springs and wells should also receive attention."

In accordance with this plan the Board commenced in July a systematic monthly chemical and bacteriological examination of the waters of the Pawtuxet river, which supplies the greatest number of population in the state, there being an estimated population of the city of Providence alone (geometrical increase) of 142,497.

In addition to this, single samples were taken from supplies in other parts of the state whenever especial interest in a supply waranted an examination.

The advantage of periodical examinations has a value in comparison of the results from month to month and from year to year and thereby a determination as to the possibility of contamination may be made. An individual examination made at any one time would alone be of little value, for if the sample taken showed a purity compared with samples from other rivers it would lead to a conclusion which would be misleading since during all the rest of the year the supply might be poor in quality. Likewise an individual sample might be taken during peculiar and unusual conditions of the source of supply, whereby a water of a very poor quality would be obtained and on analysis might be condemned as a continuous supply for drinking purposes, yet it might be the case that eleven other samples taken at periodical intervals would show an average quality which would be up to the standard.

Another advantage of the periodical examination is the possibility of determining the opportunities for an outbreak of disease before the epidemic may occur, and to study the relation of epidemics to the supply, and after years of records it would be possible to obtain information which would give practical deductions.

Owing to the limited amount of appropriations received from the legislature this work has been limited to the one supply referred to; and it is to be hoped that in future years a sufficient amount may be appropriated to enable the Board to keep informed of the condition of the various supplies, some of which are controlled entirely by private corporations where care is sometimes diverted to the quantity rather than the quality.

The collection of the samples were not made on any particular date but were collected usually on the Thursday coming nearest to the fifteenth of the month. This was done upon the suggestion given by the Engineer's Department of the State Board of Health of Massachusetts.

It was considered that a sample taken from the river on a particular date, as for instance the first or fifteenth of the month, would not give a fair average of the quality of the water, inasmuch as those dates might fall upon a Monday, in which case the mills having been shut down since Saturday night thirty-six hours would have passed, during which time the river was not being used at its maximum and the maximum contamination would not be present. Likewise if the sample was collected on a Saturday it would give the result of a whole week's contamination. Being taken on a Thursday would give a sample which would have a better average.

The locations from where the samples were taken from the Pawtuxet river were as follows: One from the north branch of the river at the village of Hope, at a point where the water enters the mill in the trench. A second sample was taken at Washington, on the southwest branch, at a point located above the mill and where the supply of the mill is taken in.

The third sample was collected on the same day as the other two, and some hours later, at the intake of the Pettaconsett Pumping Station and at the same point where the samples are collected by the City of Providence for their analyses.

The north branch from Hope to where the river meets the southwest branch at River Point flows a distance of about three and one quarter miles and has a drainage area, as given by Mr. Wes-

ton, of the City Engineer's Department of Providence, of about 107.79 square miles. The distance from Washington on the south-west branch to the point where it joins the north branch is about six miles and has a drainage area of about 67.79 square miles. From River Point to the intake at the Pettaconsett Pumping Station where the third sample was taken is about five miles and has a drainage area of about 19.42 square miles. The total area of the whole water shed above the pumping station is 195 square miles.

Along this stream at frequent intervals below the points where the first two samples are collected there are numerous cotton and woolen mills from which, and from the towns which are made up of the population which supplies these mills with labor, produce a certain amount of refuse matter which finds its way into the river. In addition to this the distance of the points where the different samples are taken would go to show that the sedimentation which occurs at the various dams where the water is held back at these various mills is not sufficient to reduce the amount of accumulated contamination to any appreciable extent.

The reports of the examinations of the water taken at these points are given below, and are arranged first by dates, giving the results obtained from each sample separately. The results are shown in parts in 100,000 as is customary in the reports made by the Massachusetts State Board of Health ; and also by grains per gallon in order that comparisons may be readily made when other analyses may have been computed by that method.

The next arrangement is made collectively by dates, giving the results of the examination of the samples taken at the different sources on the same day, which admits of comparison of the changes in the water from one point to the other.

The next arrangement is made collectively by dates at one point only and will give the differences which occur from month to month during the different seasons.

The chemical analyses were made by Mr. George Perkins, State Assayer and Inspector of Milk for the city of Providence ; and the bacteriological analyses were made by the Rhode Island Laboratory, which is under the direction of Gardner T. Swarts, M. D., and Jay Perkins, M. D.

Water Supply of Providence, by Place and Date.

Chemical and Bacteriological Examination of Water from the South Branch of the Pawtuxet River, at Washington Village.

[Italic figures—Parts per 100,000. Roman figures—Grains per U. S. Gallon.]

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. Dissolved.	Albuminoid. Suspended.		As Nitrates.	As Nitrites.		
1894. July 13	None.	Slight. Floccu-lent.	*.007*	*5.0* 2.91	*2.0* 1.16	*3.0* 1.75	*.0006* .0004	*.01* .0058	*.01* .0058	....	*.857* .500	trace trace	*.000* .000	*.77* .449	......

Chemical and Bacteriological Examination of Water from the North Branch of the Pawtuxet River, at Hope Village.

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. Dissolved.	Albuminoid. Suspended.		As Nitrates.	As Nitrites.		
1894. July 13	None.	Slight. Peaty.	*.0062*	*6.14* 3.583	*2.43* 1.418	*3.71* 2.165	*.0006* .0004	*.0115* .0067	*.0115* .0067	....	*.71* .414	trace trace	*.000* .000	*.77* .449	......

Chemical and Bacteriological Examination of Water from the Pawtuxet River at the Pettaconsett Pumping Station.

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. Dissolved.	Albuminoid. Suspended.		As Nitrates.	As Nitrites.		
1894. July 13	None.	Consid. Floccu-lent, rusty.	*.00625*	*5.57* 3.25	*2.57* 1.50	*3.00* 1.75	*.0013* .0007	*.015* .0086	*.014* .0081	*.001* .00058	*.857* .500	trace trace	*.000* .000	*.99* .577	......

WATER SUPPLY OF PROVIDENCE, BY PLACE AND DATE.

Chemical and Bacteriological Examination of Water from the Pawtuxet River, at Washington Village.

[Italic figures—Parts per 100,000. Roman figures—Grains per U. S. Gallon.]

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
								Albuminoid.							
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.		
1894. Aug 30	None.	Slight. Earthy. rusty.	*.30*	*4.5* 2.62	*.7* .40	*4.8* 2.22	*.0013* .00075	*.017* .0099	*.0165* .0096	*.0005* .0003	*.6* .34	*.000*	*.000*	*1.24* .72	*306*

Chemical and Bacteriological Examination of Water from the North Branch of the Pawtuxet River, at Hope Village.

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
								Albuminoid.							
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.		
1894. Aug.30	None.	Slight. Rusty.	*.25*	*3.1* 1.80	*1.1* .64	*2.0* 1.16	*.0013* .0075	*.0172* .00991	*.017* .0099	*.0002* .00001	.6 .34	*.000*	*.000*	*1.15* .67	*855*

Chemical and Bacteriological Examination of Water from the Pawtuxet River, at the Pettaconsett Pumping Station.

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
								Albuminoid.							
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.		
1894. Aug.30	Flocculent. Slight.	Dirty. Rusty.	*.5*	*6.0* 3.49	*1.4* .81	*4.6* 2.68	*.001* .00058	*.035* .0204	*.034* .0198	*.001* .00058	*.9* .52	*.00* .00	trace trace	*1.5* .87	*17703*

This sample was taken from inside the inlet crib, where a certain amount of detritus may have accumulated, but the river was very low owing to water being held back by one of the mills on the river for the purpose of making repairs in trench.

Water Supply of Providence, by place and date.

Chemical and Bacteriological Examination of Water from the South Branch of the Pawtuxet River, at Washington Village.

[Italic figures—Parts per 100,000. Roman figures—Grains per U. S. Gallon.]

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. Dissolved.	Albuminoid. Suspended.		As Nitrates.	As Nitrites.		
1894. Sep. 27	Slight. Milky.	Consid. Earthy Floccu-lent.	*.5*	*4.1* 2.39	*1.2* .69	*2.9* 1.70	*.004* .0023	*.015* .0087	*.0145* .0084	*.0005* .00029	*.6* .35	*.01* .0058	*.00* .00	*1.15* .665	*150*

Chemical and Bacteriological Examination of Water from the North Branch of the Pawtuxet River, at Hope Village.

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. Dissolved.	Albuminoid. Suspended.		As Nitrates.	As Nitrites.		
1894. Sep. 27	Slight. Milky.	Slight. Floccu-lent.	*.4*	*3.7* 2.15	*1.6* .93	*2.1* 1.22	*.0021* .0012	*.0156* .0090	*.0151* .0087	*.0005* .0003	*.7* .4	*.01* .0058	*.00* .00	*1.38* .80	*14773*

Chemical and Bacteriological Examination of Water from the Pawtuxet River, at the Pettaconsett Pumping Station.

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. Dissolved.	Albuminoid. Suspended.		As Nitrates.	As Nitrites.		
1894. Sep. 27	Slight. Milky.	Consid. Brown, Floccu-lent.	*.4*	*6.6* 3.81	*1.4* .81	*5.2* 3.03	*.0024* .0014	*.0162* .0093	*.0152* .0087	*.001* .00058	*1.* .58	*.01* .0058	*.00* .00	*1.61* .93	*2034*

WATER SUPPLY OF PROVIDENCE, BY PLACE AND DATE.

Chemical and Bacteriological Examination of Water from the Pawtuxet River, at Washington Village.

[Italic figures—Parts per 100,000. Roman figures—Grains per U. S. Gallon.]

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
								Albuminoid.							
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.		
1894. Oct. 19	None.	Slight. Clayey.	*.5*	*6.5* 3.79	*1.2* .69	*5.3* 3.10	*.002* .0011	*.012* .0069	*.0115* .0066	*.0005* .00029	*.9* .52	*.04* .023	*.00* .00	*1.07* .62	*195*

Chemical and Bacteriological Examination of Water from the Pawtuxet River, at Hope Village.

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
								Albuminoid.							
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.		
1894. Oct. 19	None.	Slight. Clayey.	*.2*	*4.1* 2.39	*1.1* .64	*3.0* 1.74	*.0005* .00029	*.0105* .0061	*.0098* .0057	*.0007* .0004	*.9* .52	*.04* .023	*.002* .0011	*1.23* .70	*184*

Chemical and Bacteriological Examination of Water from the Pawtuxet River, at the Pettaconsett Pumping Station.

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
								Albuminoid.							
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.		
1894. Oct. 19	Milky.	Dirty. Floccu- lent. Rusty.	*.25*	*7.1* 4.14	*2.3* 1.35	*4.8* 2.79	*.0006* .00035	*.03* .017	*.0298* .0168	*.0002* .00011	*1.2* .70	*.05* .029	*.002* .0011	*1.92* 1.10	*22068*

WATER SUPPLY OF PROVIDENCE, BY PLACE AND DATE.

Chemical and Bacteriological Examination of Water from the Pawtuxet River, at Washington Village.

[Italic figures—Parts per 100.000. Roman figures—Grains per U. S. Gallon.]

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
								Albuminoid.							
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.		
1894 Nov 15	Milky.	Rusty. Flocculent.	*.5*	*5.8* 3.38	*1.1* .64	*4.7* 2.74	*.000* .000	*.012* .007	*.011* .0064	*.001* .00058	*1.1* .64	*.00* .00	*.00* .00	*1.6* .93	*243*

Chemical and Bacteriological Examination of Water from the Pawtuxet River, at Hope Village.

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
								Albuminoid.							
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.		
1894. Nov 15	None.	Very slight.	*.35*	*4.8* 2.80	*1.1* .64	*3.7* 2.16	*.000* .000	*.012* .070	*.012* .070	*.000* .000	*1.0* .58	*.05* .029	*.00* .00	*1.53*	*526*

Chemical and Bacteriological Examination of Water from the Pawtuxet River, at Pettaconsett.

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
								Albuminoid.							
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.		
1894. Nov.15	Milky.	Cons. dirty. Flocculent.	*.4*	*6.3* 3.67	*1.1* .64	*5.2* 3.03	*.0013* .00076	*.0135* .00775	*.0133* .00764	*.0002* .00011	*1.1* .64	*.05* .029	*.002* .0011	*.5* .29	*771*

WATER SUPPLY OF PROVIDENCE, BY PLACE AND DATE.

Chemical and Bacteriological Examination of Water from the Pawtuxet River, at Coventry Centre.

[Italic figures—Parts per 100,000. Roman figures—Grains per U. S. Gallon.]

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. Dissolved.*	Albuminoid. Suspended.		As Nitrates.	As Nitrites.		
1894. Nov. 15	None.	Very slight.	*.25*	*4.0* 2.33	*.8* .46	*3.2* 1.87	*.000* .000	*.0114* .0067	*.0114* .0067	*.000* .000	*.8* .46	*.00* .00	*.00* .00	*1.54* .90	*245*

Chemical and Bacteriological Examination of Water from the Pawtuxet River — Brook near Coventry Centre.

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. Dissolved.	Albuminoid. Suspended.		As Nitrates.	As Nitrites.		
1894. Nov. 15	None.	None.	*.5*	*5.6* 3.26	*1.3* .76	*4.3* 2.5	*.0006* .00035	*.009* .0052	*.009* .0052	*.000* .000	*.6* .35	trace trace	*.000* .000	*1.48* .86	*291*

Chemical and Bacteriological Examination of Water from the Pawtuxet River, at Washington.

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. Dissolved.	Albuminoid. Suspended.		As Nitrates.	As Nitrites.		
1894. Dec. 13	None.	Consid. Floccenlent.	*.55*	*5.1* 2.97	*1.3* .75	*3.8* 2.22	*.0006* .00034	*.0075* .0043	*.0073* .0042	*.00014* .00008	*.8* .46	*.00* .00	*.00* .00	*1.38* .80	*1948*

Water Supply of Providence, by place and date.

Chemical and Bacteriological Examination of Water from the Pawtuxet River, at Hope.

[Italic figures—Parts per 100,000. Roman figures—Grains per U. S. Gallon.]

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No of Bacteria Colonies.
								Albuminoid.							
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.		
1894. Dec. 13	None.	Consid. Floccu-lent.	*.5*	*6.2* 3.61	*1.6* .93	*4.6* 2.68	*.000* .000	*.012* .007	*.0118* .0069	*.0002* .0001	*.8* .46	*.00*	*.00*	*1.38* .80	*3513*

Chemical and Bacteriological Examination of Water from the Pawtuxet River, at Pettaconsett.

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
								Albuminoid.							
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.		
1894. Dec. 13	Milky.	Very dirty.	*.4*	*3.7* 2.15	*1.1* .64	*2.6* 1.51	*.0026* .0015	*.0095* .0055	*.0092* .00536	*.0003* .00017	*.8* .46	slight trace slight trace	slight trace slight trace	*1.46* .84	*11554*

WATER SUPPLY OF PROVIDENCE, COLLECTIVELY, BY DATES, AT DIFFERENT POINTS.

Results of Examinations of Waters of Pawtuxet River for July, 1894.

(Parts per 100,000).

Place of Collection.	Appearance.		Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. Dissolved.	Albuminoid. Suspended.		As Nitrates.	As Nitrites.		
Washington...	Slight. Flocculent.	.007	5.0	2.0	3.0	.0006	.01	.01	......	.857	trace	.000	.77	......
Hope	Slight. Peaty.	.0062	6.14	2.43	3.71	.0006	.0115	.0115	......	.71	trace	none	.77	......
Pettaconsett ..	Consid. Floc. Rusty.	.00625	5.57	2.57	3.00	.0013	.015	.014	.001	.857	trace	.000	.99	......

Results of Examinations of Waters of Pawtuxet River for August, 1894.

(Parts per 100,000).

Place of Collection.	Appearance.		Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Albuminoid. Total.	Albuminoid. Dissolved.	Albuminoid. Suspended.		As Nitrates.	As Nitrites.		
Washington...	Slight. earthy. Rusty.	.30	4.5	.7	3.8	.0013	.017	.0165	.0005	.6	none	none	1.24	306
Hope	Slight. Rusty.	.25	3.1	1.1	2.0	.0013	.0172	.017	.0002	.6	.000	.000	1.15	855
Pettaconsett ..	Dirty. Rusty.	.5	6.0	1.4	4.6	.001	.035	.034	.001	.9	.000	trace	1.5	17703*

*This sample was taken from inside the inlet crib, where a certain amount of detritus may have accumulated, but the river was very low owing to water being held back by one of the mills on the river for the purpose of making repairs in the trench.

WATER SUPPLY OF PROVIDENCE, COLLECTIVELY, BY DATES, AT DIFFERENT POINTS.

Results of Examinations of Waters of Pawtuxet River for September, 1894.

(Parts per 100,000).

Place of Collection.	Appearance.		Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
							Albuminoid.							
	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.		
Washington...	Consid. earthy flocc't.	.5	4.1	1.2	2.9	.004	.015	.0145	.0005	.6	.01	.00	1.15	150
Hope	Slight. Flocculent.	.4	3.7	1.6	2.1	.0021	.0156	.0151	.0005	.7	.01	.00	1.38	14773
Pettaconsett ..	Consid. brown flocc't.	.4	6.6	1.4	5.2	.0024	.0162	.0152	.001	1.	.01	.00	1.61	2034

Results of Examinations of Waters of Pawtuxet River for October, 1894.

(Parts per 100,000).

Place of Collection.	Appearance.		Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
							Albuminoid.							
	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.		
Washington...	Slight. clayey.	.5	6.5	1.2	5.3	.002	.012	.0115	.0005	.9	.04	.00	1.07	195
Hope	Slight. clayey.	.2	4.1	1.1	3.0	.0005	.0105	.0098	.0007	.9	.01	.002	1.23	184
Pettaconsett ..	Dirty. Flocc't. Rusty.	.25	7.1	2.3	4.8	.0006	.03	.0298	.0002	1.2	.05	.002	1.92	22068

WATER SUPPLY OF PROVIDENCE, COLLECTIVELY, BY DATES, AT DIFFERENT POINTS.

Results of Examinations of Waters of Pawtuxet River for November, 1894.

(Parts per 100,000).

Place of Collection.	Appearance.		Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
							Albuminoid.							
	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.		
Washington...	Rusty. Flocculent.	.5	5.8	1.1	4.7	.000	.012	.011	.001	1.1	.00	.00	1.6	243
Hope	Very slight.	.25	4.8	1.1	3.7	.000	.012	.012	.000	1.0	.05	.00	1.53	526
Pettaconsett ..	Consid. dirty flocc't.	.4	6.3	1.1	5.2	.0018	.0135	.0133	.0002	1.1	.05	.002	1.82	771

Results of Examinations of Waters of Pawtuxet River for December, 1894.

(Parts per 100,000).

Place of Collection.	Appearance.		Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
							Albuminoid.							
	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.		
Washington ...	Consid. Flocculent.	.55	5.1	1.3	3.8	.0006	.0075	.00736	.00014	.8	.00	.00	1.38	1948
Hope	Consid. Flocculent.	.5	6.2	1.6	4.6	.000	.012	.0118	.0002	.8	.00	.00	1.38	3513
Pettaconsett ..	Very dirty.	.4	3.7	1.1	2.6	.0026	.0095	.0092	.0003	.8	slight trace	slight trace	1.46	11554

WATER SUPPLY OF PROVIDENCE, BY DATE, COLLECTIVELY.

Chemical and Bacteriological Examination of Water from the Pawtuxet River, at Washington Village, collectively, by months.

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
								Albuminoid.							
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.		
1894. July 13	None.	Slight. Flocculent.	.007	5.0	2.0	3.0	.0006	.01	.01	......	.85	trace	.00	.77	......
Aug. 30	None.	Slight. earthy; rusty.	.30	4.5	.7	3.8	.0013	.017	.0165	.0005	.6	none	none	....	306
Sep. 27	Slight. Milky.	Consid. earthy flocc't.	.5	4.1	1.2	5.9	.004	.015	.0145	.0005	.6	.01	.00	1.15	150
Oct. 19	None.	Slight. clayey.	.5	6.5	1.2	5.3	.002	.012	.0115	.0005	.9	.04	.00	1.07	195
Nov. 15	Milky.	Rusty flocc't.	.5	5.8	1.1	4.7	.000	.012	.011	.001	1.1	.00	.00	1.6	243
Dec. 13	None.	Consid. flocc't.	.55	5.1	1.3	3.8	.0006	.0075	.00736	.00014	.8	.00	.00	1.38	1948
Average..................				5.2	1.2	3.9	.0014	.0012	.0118	.0005	.8	.008	.00	1.19	568

Chemical and Bacteriological Examination of Water from the North Branch of the Pawtuxet River, at Hope Village, collectively, by months.

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
								Albuminoid.							
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.		
1894. July 13	None.	Slight. peaty.	.0062	6.14	2.43	3.71	.0006	.0115	.0115	......	.71	trace	none	.77	......
Aug. 30	None.	Slight. rusty.	.25	3.1	1.1	2.0	.0013	.0172	.017	.0002	.6	.000	.000	1.15	855
Sep. 27	Slight. Milky.	Slight. flocc't.	.4	3.7	1.6	2.1	.0021	.0156	.0151	.0005	.7	.01	.00	1.38	14773
Oct. 19	None.	Slight. clayey.	.2	4.1	1.1	3.0	.0005	.0105	.0098	.0007	.9	.04	.002	1.23	184
Nov. 15	None.	Very slight.	.25	4.8	1.1	3.7	.000	.012	.012	.000	1.0	.05	.00	1.53	526
Dec. 13	None.	Consid. flocc't.	.5	6.2	1.6	4.6	.000	.012	.0118	.0002	.8	.00	.00	1.38	3518
Average..................				4.6	1.5	3.2	.0007	.0131	.0129	.0003	.78	.02	.000	1.21	3970

WATER SUPPLY OF PROVIDENCE, BY DATE, COLLECTIVELY.

Chemical and Bacteriological Examination of Water from the Pawtuxet River, at Pettaconsett, collectively, by months.

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
								Albuminoid.							
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.		
1894. July 13	None.	Consid. flocc't; rusty.	.00625	5.67	2.67	3.0	.0013	.015	.014	.001	.85	trace	.000	.99	......
Aug. 30	Flocc't slight.	Dirty; rusty.	.5	6.0	1.4	4.6	.001	.035	.034	.001	.9	.00	trace	1.5	17703
Sep. 27	Slight. milky.	Consid. brown flocc't.	.4	6.6	1.4	5.2	.0024	.0162	.0152	.001	1.	.01	.00	1.61	2034
Oct. 19	Milky.	Dirty flocc't; rusty.	.25	7.1	2.3	4.8	.0006	.03	.0298	.0002	1.2	.05	.002	1.92	22063
Nov. 15	Milky.	Consid. dirty flocc't.	.4	6.3	1.1	5.2	.0013	.0135	.0133	.0002	1.1	.05	.002	1.82	771
Dec. 13	Milky.	Very dirty.	.4	3.7	1.1	2.6	.0026	.0095	.0092	.0003	.8	slight trace	slight trace	1.46	11554
Average..................				5.7	1.6	4.2	.0015	.0199	.0192	.0006	.67	.02	.001	1.55	9021

Water Supply of the City of Woonsocket.

Owing to the small amount of rainfall which occurred during the summer of 1894, the storage and reservoir supply of the water-works of the city of Woonsocket were drawn upon to an unusual extent. As a result, the supply in the reservoir fell below the upper intake, and it became necessary to draw the water from the lower outlet of the reservoir.

This water naturally contained a large amount of the sedimentation from the waters which had been previously stored and drawn off, and consequently contained more organic sediment than the average supply. As a result, the water presented an increased depth of color and the peculiar taste associated with the presence of organic matter.

Dissatisfaction on the part of the water-takers grew to a fear that the continued ingestion of the water might lead to injurious results and disease.

Under these conditions the Water Board of the city called upon the State Board of Health for such assistance and advice as might be given to determine the quality of the water and to allay any fear of danger, if none existed.

An examination of the whole watershed was made by the Secretary of the Board in company with Mr. Byron W. Cook, the Superintendent of the Water Works, and it was found that the water in the upper reservoir was entirely drawn off, and that the lower, or intake reservoir, was very low. Possibilities of contamination existed at two places only. At one point on the Crook Fall Brook a large mass of decaying apples taken from a cider-press had been thrown upon the ground near the brook. At another point night-soil deposits from a neighboring town were found dumped upon a sloping field so situated that with a continued rainfall these wastes might be carried into the brook. The attention of the health officer of the town of Lincoln was called to this nuisance, and it was at once abated.

At this time a sample of water was taken from a faucet in the city by Mr. Cook and submitted to the Board for analysis. The result of the analysis was as follows :

[Italic figures—parts per 100,000. Roman figures—Grams per U. S. Gallon.]

Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
							Albuminoid.							
Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.		
Milky.	Very rusty.	*2.0*	*10.2*	*1.1*	*9.1*	*.0053*	*.0355*	*.034*	*.0015*	*.6*	*.00*	*.00*	*1.84*	*190*
			5.81	.61	5.20	.0031	.0206	.0198	.0008	.35	.00	.00	1.07	

Date of Collection—September 18, 1894.

It will be noted that the nitrogen is entirely absent in the form of nitrates and nitrites, while the ammonias, both free and albuminoid, are high. This, of course, is explainable in the fact that the water examined was practically the sediment rather than the supply. A noticeable feature of this analysis is the small number of micro-organisms per cubic centimetre. This small number would be such as would be found in an analysis of well-water, and suggests the methods of purification resulting from sedimentation. The organic matter having settled to the bottom has been reduced by the action of the organisms until there is little or no nutrient material for them to exist upon, and they consequently die.

During the month of June* there had been a rainfall of only .7 inches; in July, 1.85; in August, 1.99; or a total for the three months of 4.61 inches. The average daily consumption of water in this city for 1894 was 563,368 gallons, while the average daily consumption in the month of July was 706,516 gallons. The demand therefore became greater as the supply diminished. At this time, by order of the water commissioners, street watering and lawn hydrants were discontinued, and the amount of water used fell during the month of August.

An increased rainfall followed soon after, and an accumulation of water occurred in the reservoir, sufficient to permit of withdrawal for a full supply from the regular intake of the pumping station. An analysis of the water at this time gave the following result:

---

*See pages 55 and 56.

[Italic figures—Parts per 100,000. Roman figures—Grams per U. S. Gallon].

Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
							Albuminoid.							
Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.		
None.	Slight. brownish.	*.75*	*7.2* 4.19	*1.5* .87	*5.7* 3.32	*.000* .000	*.02* .011	*.0189* .0110	*.0011* .0006	*.7* .4	trace trace	*.000* .000	*.99* .57	*539*

Date of Collection—October 15, 1894.

It will be noticed that the ammonias were very much reduced from the results given in the sample taken in September, the free ammonias being entirely absent.

During the month of October alone there occurred a rainfall of 6.46 inches, which filled the reservoirs. At this time a sample of water was taken from the upper reservoir, also one from three feet below the surface at the intake of the lower reservoir, and a third sample from a faucet at 59 Carrington avenue, in the city.

These samples would give about the average conditions which might occur under the usual amount of storage, and would probably give the same results as samples which might be taken under the conditions of the proposed additional storage area.

[All figures parts per 100,000].

Place of Collection.	Appearance.		Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
							Albuminoid.							
	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.		
Upper Reservoir No. 1	Rusty flocculent.	.5	5.2	1.9	3.3	.0006	.012	.012	.000	1.0	.00	.00	1.3	769
Lower Reservoir No. 2	None.	.5	5.5	1.3	4.2	trace	.0135	.0135	.000	1.1	.00	.00	1.4	221
Faucet Supply, City.	None.	.5	6.3	1.8	4.5	.000	.0139	.0139	.000	1.0	.00	.00	1.3	194

Date of Collection November 16, 1894.

Examination of Waters of the Blackstone River.

For several years the State Board of Health of Massachusetts has made a study of the water supplies of its State and of certain rivers which are contaminated by sewage wastes. The Blackstone river at Worcester received for some time all the sewage wastes from that city; and for the purpose of determining the amount of contamination and its effect upon the waters below that city, which might be utilized by other towns for various purposes, also for the purpose of determining the amount of purification which occurred in such a contaminated water after flowing certain distances, chemical examination of samples taken from this river at several points were made. These samples were all taken within the State of Massachusetts. The Blackstone river on leaving that State flows for several miles through the State of Rhode Island before reaching tide water. In order to complete the record of these examinations, samples were collected monthly from two points inside this State. One was taken from the trench leading to the mill at Albion on the Providence and Worcester road and the other at Valley Falls. The first of the latter samples were taken at the Broad Street bridge between Valley Falls and Central Falls, but owing to the possible added contamination from the manufactories above the bridge the later samples were collected from the John Street bridge.

The results of these analyses are as follows:

Chemical and Bacteriological Examination of Water from the Blackstone River, collectively, during the month of July.

(All figures parts per 100,000).

Place of Collection.	Appearance.		Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
							Albuminoid.							
	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.		
Albion.........	Consid. flocc't. Rusty.	.4	6.7	2.7	4.0	.0067	.0185	.0165	.0020	1.4	3.1	.025	.004	552
Valley Falls...	"	1.0	8.4	3.0	5.4	.0020	.032	.019	.013	1.9	3.8	.025	.0025	12802

Chemical and Bacteriological Examination of Water from the Blackstone River, collectively, during the month of August.

(All figures parts per 100,000).

Place of Collection.	Appearance.		Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
							Albuminoid.							
	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.		
Albion.........	Flocculent; rusty.	.005	7.5	1.2	6.3	.01	.0235	.023	.005	1.0	.25	.013	1.61	12509
Valley Falls...	"	.0075	8.1	1.0	7.1	.008	.02	.016	.004	1.0	1.00	.010	1.76	6126

Chemical and Bacteriological Examination of Water from the Blackstone River, collectively, during the month of September.

(All figures parts per 100,000).

Place of Collection.	Appearance.		Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
							Albuminoid.							
	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.		
Albion.........	Rusty.	.4	7.6	1.2	6.4	.0106	.0135	.0132	.0003	1.	.085	.0028	2.07	1517
Valley Falls... (John st. Br.)	Rusty.	.3	9.0	1.6	7.4	.0026	.0210	.0205	.0005	1.1	.082	.0024	2.23	3835
Valley Falls... (V. F. Br.)	Dirty flocc't.	.3	8.3	1.4	6.9	.0053	.0199	.0185	.0014	1.2	.083	.0024	2.25	1780

Chemical and Bacteriological Examination of Water from the Blackstone River, collectively, during the month of October.

(All figures parts per 100,000).

Place of Collection.	Appearance.		Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
							Albuminoid.							
	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.		
Albion.........	Dirty; black; rusty.	.25	9.7	1.3	8.4	.000	.0525	.0519	.0006	1.4	.10	.004	2.3	12284
Valley Falls... (John st. Br.)	"	.25	10.7	1.7	9.0	.000	.0480	.0478	.0010	1.3	.05	.003	2.46	9702

Chemical and Bacteriological Examination of Water from the Blackstone River, collectively, during the month of November.

(All figures parts per 100,000).

Place of Collection.	Appearance.		Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
							Albuminoid.							
	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.		
Albion.........	Consid. Rusty Floc.	.25	6.0	1.9	4.1	.01	.0151	.0146	.0005	1.	.0048	.0028	2.08	3453
Valley Falls...	"	.25	11.6	3.3	8.3	.03	.018	.0176	.0004	1.1	.0050	.000	2.25	4340

Chemical and Bacteriological Examination of Water from the Blackstone River, collectively, during the month of December.

(All figures parts per 100,000).

Place of Collection.	Appearance.		Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
							Albuminoid.							
	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.		
Albion.........	Slight. Rusty.	.2	7.5	1.5	6.0	.0266	.018	.0172	.0008	.9	.0049	.0005	1.89	8020
Valley Falls...	"	.2	8.3	1.8	6.5	.0262	.018	.017	.001	.9	.005	.0005	1.92	5931

Chemical and Bacteriological Examination of Water from the Blackstone River, at Albion, collectively, by months.

(All figures parts per 100,000).

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.	No. of Bacteria Colonies.
								Albuminoid.							
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.		
1894. July 25	Decid. milky.	Consid. flocc't; rusty.	.4	6.7	2.7	4.0	.0067	.0185	.0165	.0020	1.4	.025	.004	3.1	552
Aug. 22	None.	Flocc't rusty.	.005	7.5	1.2	6.3	.0100	.0235	.0230	.0005	1.0	.250	.013	1.61	12509
Sep. 22	Slight. milky.	Rusty.	.4	7.6	1.2	6.4	.0106	.0135	.0132	.0003	1.0	.085	.0028	2.07	1517
Oct. 20	Slight. milky.	Dirty; black: rusty.	.25	9.7	1.3	8.4	.0000	.0525	.0519	.0006	1.4	.100	.0040	2.30	12284
Nov. 17	Milky.	Consid. rusty flocc't.	.25	6.0	1.9	4.1	.01	.0151	.0146	.0005	1.0	.0048	.0028	2.08	3453
Dec. 14	Milky.	Slight. rusty.	.20	7.5	1.5	6.0	.0266	.0180	.0172	.0008	0.9	.0049	.0005	1.89	8020

*Chemical and Bacteriological Examination of Water from the Blackstone River, at Valley Falls, collectively, by months.**

(All figures parts per 100,000).

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine	Nitrogen.		Hardness.	No. of Bacteria Colonies.
								Albuminoid.							
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.		
1894 July 25	Decid. milky.	Flocculent; rusty.	1.0	8.4	3.0	5.4	.002	.032	.019	.013	1.9	3.8	.025	.0025	12802
Aug. 22	None.	Flocculent; rusty.	0.007	8.1	1.0	7.1	.008	.020	.016	.004	1.0	1.00	.01	1.7	6126
Sep. 22	Slight. milky.	Dirty flocculent.	0.3	8.3	1.4	6.9	.0053	.0199	.0185	.0014	1.2	.083	.0024	2.25	1780
Sep. 22	Rusty.	Rusty.	0.3	9.0	1.6	7.4	.0026	.0210	.0205	.0005	1.1	.082	.0024	2.23	3835
Oct. 20	Slight. milky.	Dirty; black; sl. rust.	0.25	10.7	1.7	9.0	.0000	.0180	.0478	.0010	1.3	.05	.0030	2.46	9702
Nov. 17	Milky.	Consid. rusty flocc't.	0.25	11.6	3.3	8.3	.0300	.0180	.0176	.0004	1.1	.005	.003	2.25	4340
Dec. 14	Milky.	Slight. rusty.	0.20	8.3	1.8	6.5	.0262	.0180	.0170	.0010	.9	.005	.0005	1.92	5981

* The first three samples are from Valley Falls bridge; the remainder from John street bridge.

INSPECTION OF STATE MILITIA CAMP AT QUONSET POINT.

During the January Session of the Legislature, the Secretary of the Board called the attention of the Governor to the desirability of a sanitary inspection of the Camp of the State Militia, which makes its annual camping ground at Quonset Point, on Narragansett Bay.

This camp is located on a point extending into Narragansett Bay, and is delightfully situated as a place for a summer outing for anyone, and especially so for the purposes for which it is intended. On the north and south a view of the bay may be obtained, and the breezes which are to be obtained through almost all the entire summer are to be felt at this point.

It is situated about midway between Providence and Newport on the west shore, and offers opportunities for drill of different forms which would not be available at an inland camping ground.

Upon the suggestion of the Governor the Adjutant-General issued orders to the Medical Director of the Brigade Rhode Island Militia to confer with the Secretary of the State Board of Health, and to inspect the camp grounds with a view to ascertain the sanitary conditions present, and to ascertain if the water supply and conditions were adequate to the demands of the coming encampment.

An inspection was made. Upon the request of the Medical Director, the Secretary of the Board accompanied him to the camp grounds, the result of the inspection being reported by the Secretary to the Medical Director, as follows:

LIEUT.-COL. CHARLES H. FRENCH, JULY 9, 1894.
MEDICAL DIRECTOR, BRIGADE R. I. MILITIA,
CAMP R. I. MILITIA, QUONSET POINT, R. I.

DEAR DOCTOR:

From the sanitary inspection of the State Camp at Quonset Point, made in connection with you as Medical Director, Brigade R. I. Militia, on July 5, 1894, I beg to submit the following report and suggestions:

The location of the camp from a sanitary point of view is everything that can be desired or could be obtained at this sea level.

The soil consists of sand and gravel, with no underlying strata in the immediate subsoil, thus admitting of perfect freedom from continued dampness which is especially desirable in any encampment.

The water supply for drinking is so located as to be entirely removed from any possible surface or subsoil contaminations. It is derived from three driven wells, separated from each other by a distance of about five feet, and connected together. The size of the pipe is three inch. The depth of the wells is respectively 14, 14 and 13 feet, through sand and gravel. They are capable of delivering a supply of 15 gallons a minute. The water is raised by means of a portable pump and boiler on wheels. The quality of the water as determined by the chemical and bacteriological analyses shows that it is a pure water, free from sediment and free from coloring matters. The water is pumped directly into wine casks, which are carted to the company streets and to the tents of the various caterers. The casks are painted on the outside. I would suggest that it would be desirable to have this painting done as early in the season as possible to allow the paint to become thoroughly dry and hardened.

A second supply of water is located near the cavalry stables, and is taken from a similar driven well, 14 feet deep, the water being raised by means of a hand pump, delivering it into an open trough. This is intended solely for the use of horses, but as this well is liable to be drawn upon for drinking water in case of failure of the main supply either in quantity or from mishap to the pumping apparatus, I deemed it desirable to have an analysis of this water made that the Medical Director might feel safe in recommending this for general use or for prohibiting the use of the same if found to be of unsuitable quality.

The accompanying analysis shows it to be of even better quality than the main supply.

Another and valuable supply as far as quantity is concerned is found to be in the same vein or valley as the main supply and possibly coming from the same source. This appears to be in the form of a spring of sufficient volume to produce a small stream. This has been intercepted by a small dam, the overflow running into a horse trough. I would suggest the examination of this supply at the end of a week, as also the volume, to see if it is at all diminished by the constant use of the main supply. This has been suggested as a supply for fire purposes. This would be especially useful if reinforced by a tank and windmill and piped to certain points near the inflammable property on the grounds. If found to be of good quality I would recommend its transmission by means of pipes, either with or without the mill, to supply the caterers' sinks, inasmuch as it reduces the chances of contamination by rehandling the water in barrels, and by dipping with dirty pails.

The regiment sinks or privy vaults were found to be of the dry earth closet pattern, made by having an excavation four feet deep and eighteen inches wide, with a length of about fourteen feet. Over this was erected seats, and with a board fence about the whole, so arranged as to prevent exposure. No provision was seen for a urinal.

If an absorbent loam or sand is thrown into these ditches twice daily, it would

prove adequate. I would, however, recommend the use of a permanent system of closed closets, with an ash can receptacle beneath each seat.

I would suggest the excavation of the two ponds near the cavalry stables, as not only giving less area of decomposing organic matter upon the natural recedence of the water during the summer months, but also as reinforcing the body of surface water in the vicinity from which the pump water probably draws to a great extent for its supply.

Trusting that the suggestions from the State Board of Health will be received merely as coöperative suggestions, and offering you all the facilities of the Board in your work in connection with the State Militia at any and all times,

I am, yours truly,

GARDNER T. SWARTS,

Secretary State Board of Health.

It would seem as if this inspection should be repeated annually by the Medical Director, not alone for the necessary practice which it would involve were the camp located suddenly at some other point, or in the course of a campaign and when only a few hours are allowed for a decision.

It is of importance to the welfare of the men who attend these encampments that every sanitary condition shall be observed; for being taken from the comforts of home, from the workshop and indoor life, they are without any preparation caused to undergo a sudden and decided change in the manner and mode of living. The water supply, of course, is the one thing which will be thought of at first, but equally essential is the quality of the food which is to be supplied to these men,—undergoing exercise of a more or less unusually violent nature, with a certain amount of exposure to the inclemencies of the weather. The milk supply should receive the closest attention and should be received from such dairies as have received the approval of some central State authority or of the Medical Director. This officer should also have immediate direction of the character and quantity of food issued to the men, and should have control of the source of supply that he may sanction or condemn what to his mind might be of injury. This condition does not prevail, and the results are shown at the sick call, most of the cases being due to over-indulgence in under-cooked or canned goods, over which the Medical Director has no control.

LEGISLATION DURING THE YEAR.

During the January Session of the Legislature several bills were introduced by the Board through its secretary looking for the advanced facilities in the prosecution of the work of sanitation.

One of the most important of these was a bill providing for an appropriation of one thousand dollars for the purpose of study of the prevention of tuberculosis in man.

This was granted. The manner of use of this appropriation will be found under the title of "Control of Tuberculosis in Man."

The usual attempt to abolish the statute providing for compulsory vaccination of school children was made by a citizen who has annually presented a so-called "anti-vaccination bill." The bill was lost by vote of the speaker given against the bill in a tie vote.

IMPROVEMENT IN THE REGISTRATION OF BIRTHS, MARRIAGES AND DEATHS.

In the settlement of an estate and for purposes of insurance identification, it is frequently necessary to establish the fact that the birth, marriage or death of a certain person actually occurred, and it is partly for this as well as for the study of vital movements that the registration of births, marriages and deaths has been established in all civilized countries.

The legal adviser will naturally seek for this information in the town where the person was born or married or where they were last resident; but it is constantly occurring that a person may die in one town and the return of death be recorded in another locality to which the remains have been removed.

In the case of marriages the groom may reside in one town, the bride in a second place, and the marriage take place in some distant city or town.

One seeking for information of this kind would naturally go to the town clerk of the town where the party interested resided, at

the time of the marriage, as that fact would probably be known. It might not be known where the bride resided, although that of the groom might be known, and the fact that they went away to be married would be entirely lost sight of.

In the case of births, according to the present custom in this State, as in some others, the census of births is taken once a year only. In the city of Providence the census is taken once in six months, and a monthly report direct from physicians is provided for. This latter condition is encouraged by the payment of a fee of ten cents per birth reported by the physician.

This is as it should be, for within one month after the birth of the child, the parents, especially among the manufacturing classes may move away to some other city or State and the census or enumeration of that birth will be taken in the locality where they last reside; and as the birth did not take place in that locality it will not be credited to that town or state in the registration reports, while at the same time the town where the birth did take place has no knowledge thereof and hence does not record it or enumerate it and the birth is entirely lost for enumeration and is with difficulty found when needed for reference.

Provisions to remedy this condition have been in practice for some time in the State of Massachusetts as regards births and deaths.

In this State the registrar has found the returns of all kinds scattered all over the State, and in order to rectify the method of recording, the Secretary of the Board, as State Registrar, prepared and introduced at the January Session of the Legislature the following act, which was passed on May 4, 1894:

An Act in Amendment and in Addition to Chapter 85 of the Public Statutes, "Of Registration of Births, Deaths and Marriages."

Section 2. The clerk or registrar of each town and city shall on the first day of each and every month, make a certified copy of all births, marriages and deaths recorded in the books of said town or city during the previous month, whenever the parents of the child born, or the bride or the groom, or the deceased person, were resident in any other town or city in this state or in any other state at the time of said birth, marriage or death; and shall transmit such certified copies to the clerk or registrar of the town, city or state in which such parents of the child born, the bride or the groom, or the deceased, were resident at the time of said birth, marriage or death, stating in case of a birth, the name of the street and number of the house, if any, where such parents resided, whenever the same can be ascertained; and the clerk or registrar so receiving such certified copies shall record the same in the books kept for recording births, marriages and deaths.

Such certified copies shall be made upon blanks to be furnished for that purpose by the secretary of the state board of health.

SEC. 3. This act shall take effect upon its passage.

The attention of town clerks and city registrars was also called to an amendment passed at the same time with the preceding bill, which provides for the payment of twenty cents for recording all births, instead of twenty cents for the first fifty entries, and ten cents for each subsequent one. The law now reads as follows:

SECTION 1. Section 17 of Chapter 85 of the Public Statutes is hereby amended so as to read as follows:

"SEC. 17. The town clerks or other officers appointed under this chapter to collect, record and return the births in the several cities and towns, shall receive fees therefor as follows: For making record and return of these facts as required by law, twenty cents for each entry and return; to be paid by the city or town in which the birth is recorded."

IMPROVEMENT IN THE MEDICAL EXAMINER LAW.

Upon taking the office of State Registrar the Secretary of the Board found that no report of the work done by the Medical Examiners since the adoption of the Medical Examiner Law in place of the Coroner system, had been saved or made to any official in this State.

In other States where similar laws exist it is customary to make a statistical statement, in the registration report of the State, as to the number of cases attended by the medical examiners in cases of death from known or supposed violence, giving also the number of homicides, suicides, murders, and the methods, etc., all of which becomes valuable data for future study, not only of the medical examiner system, but for those statisticians who are making special study of causes and results of death by supposed violence.

To remedy this fault, the Secretary, with the assistance of Dr. William H. Palmer, framed the following law, which in some respects resembles the Massachusetts law covering the same intent.

It was presented and passed at the January session of the legislature.

AN ACT IN ADDITION TO CHAPTER 420 OF THE PUBLIC LAWS, ENTITLED "AN ACT RELATING TO MEDICAL EXAMINERS AND CORONERS."

[Chapter 1268. Passed May 4, 1891.]

It is enacted by the General Assembly as follows:

SECTION 1. Medical examiners shall, in books provided by the secretary of

state, keep a record of all views of bodies found dead under the provisions of the Medical Examiner's Law, together with their view and autopsy reports and, on the first of January, April, July and October, shall forward to the secretary of the state board of health, attested copies of such records of views, together with the view reports, and conclusions from autopsies. Should the commission or service of a medical examiner expire before the end of a quarter, the said examiner shall at once forward to the said secretary of the state board of health, the records and reports of all cases unreported at date of expiration of said service.

SEC. 2. For each and every copy of said record and reports forwarded to the said secretary of the state board of health, medical examiners shall receive twenty-five cents, which shall be paid by the state upon the voucher of said secretary of the state board of health, that such copy of reports and records have been received by him.

SEC. 3. The secretary of the state board of health shall cause the returns received by him for each year, in accordance with this act, to be bound together with an index thereto; the state registrar shall prepare or cause to be prepared from the said returns such tabular results as will render them of practical utility, and shall make report thereof annually in connection with the report of births, marriages and deaths required by Chapter 85 of the Public Statutes.

SEC. 4. This act shall take effect upon its passage.

Under the provision of this act each medical examiner is provided with a record book of convenient size and ruling, arranged to receive the details or notes of the cases attended and also blank sheets for reports of the important details of the cases to the Secretary of the State Board of Health, who, as State Registrar, is required to arrange and insert the findings in the Registration Report.

This will serve as a stimulant to the medical examiner to make thorough and detailed examinations in each case and will be of service to him for reference and study should the case be brought before the courts.

CONTROL OF TUBERCULOSIS IN MAN.

Early in October a plan for the investigation of tuberculosis in man was begun in this State. At the January Session of the Legislature an appropriation of one thousand dollars was made available to the State Board of Health for this purpose.

The objects sought to be obtained in this work are as follows:

First—The record of the knowledge of the existence of every known case of tuberculosis pulmonalis or consumption.

Second—The registration or record of these cases by name and premises.

Third—As far as possible to obtain a history of the conditions, existing at the present time and also preceding the commencement of the trouble.

Fourth—A record of the presence or absence of the disease in others in the same family, either at the present time or prior in the history of the family, and their relation to the patient.

Fifth—A record of all deaths both by name and premises, with corrections from time to time occasioned by change of street numbers.

Sixth—Whenever practicable or possible the thorough renovation of premises previously occupied by living or deceased cases.

Seventh—A better control and isolation of all cases in public and penal institutions.

Eighth—The dissemination of literature setting forth the contagiousness of the disease, and methods which should be adopted to prevent its spread.

Ninth—The examination of sputum in all suspected cases of this disease, for physicians, free of charge.

In order to systematize the gathering of this information, the following circular or proposition was mailed to every known practitioner in the State:

DEAR DOCTOR:—As a result of the bacteriological investigations of Prof. Koch and the confirmation of his findings by numerous other pathological observers, it has now been generally accepted that the disease commonly known as consumption or pulmonary tuberculosis, as well as tuberculosis of various other organs, is due to the entrance of, and presence of, a micro-organism known as the bacillus of tuberculosis. This organism is always present in the sputum of consumptive patients, and upon being dried in the atmosphere may be wafted in the form of dust into the air passages of others, and when the condition of reduced vitality of these parts is present, a soil is afforded favorable to the lodgment and growth of these organisms, which when once established are prone to multiply and destroy the tissues of the parts invaded.

It is evident therefore that the disease is one which can be communicated and hence one which can by prophylactic means be, in a measure, prevented.

In view of this the State Board of Health is desirous of making a study of the condition and amount of this disease at present existing in this State, and to endeavor at the same time, through the physicians or friends in attendance upon invalids of this class, to instruct the patients, as far as practical, without alarming or annoying them, in some simple methods of care of the sputum and their association with others.

It is believed that this can be done without exciting the person involved if approached in a proper way.

To obtain as much information as possible the accompanying inquiry blank is sent to you, believing that you are desirous of aiding the Board in this investigation, which will give much data and which in addition to that attained by other States will aid us in reducing the mortality of this disease, which has the highest mortality rate of any, and which being communicable and preventable is a disgrace to a civilized and intelligent medical epoch.

Should any suggestions occur to you in this connection favorable or otherwise, it will be esteemed a favor if they could be communicated to the Board, which desires to assist the physician at all times in his work and does not seek to act as a police control except when the majority of the profession considers it advisable.

In order to assist the attending physician in impressing upon the patient the need of care in the disposal of the sputum, a circular of instruction has been issued which it is desired may be brought to the notice of the patient, through the medium of the attending physician. If this meets your approval any number may be obtained from the department at any time.

In order that this investigation may have some practical application the Board has obtained from the State an appropriation for the purpose of adding to our knowledge of the subject. The Board therefore offers to the physicians of the State to make examination of the sputum coming from all doubtful cases of this disease. An enclosed blank of directions and data will explain the best method of collection and transmission of this material.

Thanking you in advance for any assistance that you can, and may, give the Board in this matter, I am,

Yours truly,

GARDNER T. SWARTS, *Secretary.*

PROVIDENCE, R. I., Sept. 1, 1894.

For reports of chronic cases in which no examination of the sputum was considered necessary, the following form was supplied in order to obtain knowledge of all existing cases.

REPORT OF A CASE OF CONSUMPTION OR TUBERCULOSIS EXISTING IN THE STATE OF RHODE ISLAND.

Name of patient...

[This is confidential and is requested only for purpose of avoiding duplicating in enumeration.]

Present residence, city or town..

Street or road..

No. of house or designation ....

First, second or third floor of house.......................................

Age of patient ....Color.................................

When was disease first noticed ?..

Where was patient living at that time ?....................................

Was the patient exposed to the disease at that time in the family ?.............

Was the patient himself or any relative of the patient affected with the disease at any time previously ?..
How many cases of the disease in the family at that time ?.. ....
How many living in the same house at the present time ?....... .. ..
Where did patient last live previous to moving into present location ?..........
To what stage has the disease advanced at present ?...........................
What is the character of the sputum at the present time ? ....
Has the disease at any time been arrested in its progress ? ....
Has change of climate been adopted as a curative means and with what results?..
Do you desire an analysis of the sputum as assistance in diagnosis ?..............
Any further data which can be given to assist this investigation will be gratefully received.
Date of report......... ....
Please send me....... of these blanks.

... .*Physician.*

In order to facilitate the collection of sputum with as little annoyance to the physician as possible, sputum collection bottles were placed at all the leading drug stores throughout the State for distribution. This bottle consists of a two-ounce glass vial, wide mouth, such as is used by druggists for ointments or powders. It has a metal screw cap and is supplied with a special rubber diaphragm in the cap to prevent leakage. The bottle, with label asking for the name of patient, physician, laboratory number, and caution to screw cap on tight, is then wrapped in wax paper to prevent leakage if the cap should not be on tight. This is placed in pasteboard mailing case. On account of the glass this is not accepted in the mails, but the distances in this State are so small that expressage is about as low as postage rates.

There is on the market a wooden mailing case which serves the purpose when a heavier case is required.

Wrapped about the bottle is a circular of instruction to the patient suggesting the method of collection of the sputum. This is worded as follows:

DIRECTIONS FOR COLLECTION OF SPUTUM FOR BACTERIOLOGICAL EXAMINATION IN PULMONARY TUBERCULOSIS.

Sputum should be collected only in clean, wide-mouthed, well-stoppered bottles, with a capacity of at least four ounces. Suitable bottles are supplied by the department, and have been placed at the principal drug stores for the convenience of physicians desiring them.

Care should be taken that bronchial and not pharyngeal secretion is collected, and the expectoration discharged early in the morning is preferred. If the expectoration is scanty, the entire amount discharged in twenty-four hours should be collected.

The data asked in the accompanying blank should be carefully filled out in every case.

Accompanying this is a blank which will permit of identification of the case.

RHODE ISLAND STATE BOARD OF HEALTH,
LABORATORY NO......
48 WEYBOSSET STREET, PROVIDENCE, R. I.

SPUTUM FROM A CASE OF SUSPECTED TUBERCULOSIS.

Name of sender of specimen...
Sputum sent constitutes all discharged for..................................hours from
......M. to .....M. Date...
Name of patient...
Age............Sex.......... .. Color. ....
Address............................ Occupation...
Att. physician....................... Address...
Clinical diagnosis...
Duration of disease...
How contracted ?..
Have there been cases of consumption in the family ?......................
How many ?..
Relation to patient...
....
....
Date of last case..
Please send........of these blanks.

The bottles are returned to the department as soon as sputum is collected and examined at the Rhode Island Laboratory.

As soon as the examination has been made a report is sent to the physician, never to the patient. If the tubercle bacilli are found to be present the following report is sent:

RHODE ISLAND STATE BOARD OF HEALTH,
LABORATORY NO......
48 WEYBOSSET STREET, PROVIDENCE, R. I............189

DR...

DEAR SIR:—The examination of the sputum from..................................
....
received on..shows the presence of the tubercle bacilli.

The case is therefore one of pulmonary tuberculosis.

If you desire to have the family instructed by an inspector as to methods of cleansing the apartments and as to general prophylaxis, kindly notify the department.

GARDNER T. SWARTS, *Secretary*.

In case there are no tubercle bacilli found the alternate report is sent as follows:

RHODE ISLAND STATE BOARD OF HEALTH,
LABORATORY NO......
48 WEYBOSSET STREET, PROVIDENCE, R. I............189

DR.... ....

DEAR SIR:—The examination of the sputum from. ....
....
received on........... .... does not show the presence of any tubercle bacilli.

It is not to be assumed, however, from the result of this examination, that the case is not one of pulmonary tuberculosis, for frequently in this disease tubercle bacilli are at times absent from the sputum, and the disease can only be *probably* excluded if repeated examinations of the sputum fail to show the presence of bacilli. If this case is still regarded as possibly tuberculosis, other specimens should be sent for examination.

It should be kept constantly in mind that the demonstration of the presence of tubercle bacilli in the sputum proves conclusively the existence of tuberculosis, but the absence of tubercle bacilli or the failure to find them microscopically does not exclude the disease.

GARDNER T. SWARTS, *Secretary*.

This gives the physician at once a practical aid in the diagnosis, and by at once instituting the necessary precautions a centre of infection is at once guarded against and the patient and the State receives the benefit of any means which can be adopted in the early stages of the disease for the suppression and treatment of the disease.

If the result of the examination is positive, the circular of "care of the sputum" is enclosed to the physician with the report. It is not sent to the patient, and no action is taken in regard to the premises or the isolation of the patient, it being assumed that the physician is sufficiently conscientious for the care of the patient and the welfare of the family of which he has charge to take all the necessary precautions and which are not at all onerous when fully understood.

The following circular of instruction concerning the proper care of the sputum and the dangers of carelessness in expectoration in tuberculous cases was submitted to physicians for distribution and copies of the same may be had in any number by application to the Secretary. While this may not cover all the ground desired in the future, when the public are as a whole more thoroughly acquainted with the workings of the disease, yet it will perhaps be

better understood than a more extended dissertation upon the subject. It is intended that these circulars shall be given by the attending physician to the family of the patient wherever it may be of service and distributed to the public through the medium of drug stores.

SUGGESTIONS FOR THE CARE OF SPUTUM IN CASES OF CONSUMPTION.

It is now generally believed that the disease commonly known as consumption is a disease which is communicable from one person to another, and is caused by minute living organisms which are always found in great numbers, in whatever portion of the body may be invaded by the disease.

These small germs or seeds are brought to the surface in the sputum or mucus, which, when carelessly thrown upon the ground or collected in cloths, becomes dry and crumble into dust. In this dust the organisms are, at times, still alive, and when blown about in the air may be breathed into the lungs and air passages.

If the lungs are in a weakened condition as the result of exposure to cold air, or by general weakness of the whole body, or when made sore by irritating substances such as fine particles of steel, in such industries as file making or steel grinding, or by breathing in fine coal dust, or by lack of fresh air as in mills, the organism finds a soil where it can grow.

In the lungs of a consumptive who is improving, the breathing in of this dust starts new points of the disease.

It is undoubtedly breathed into the mouths of many healthy persons daily, but does no harm as long as the mucous membrane is in a healthy condition.

Knowing that the sputum contains the germs from which the danger comes, it can be readily seen that if they are destroyed before it turns into dust, that it cannot produce fresh cases of the disease.

Therefore, all sputum or spit of consumptives should be treated in some way in order to destroy the germs which may produce the disease.

It is desirable that the sputum be received in some light cup, or receptacle, containing some form of disinfectant, such as a solution of bi chloride of mercury in the strength of one part to one thousand.

If received into handkerchiefs they should be immediately placed in this disinfecting solution, or under water, and as soon as possible thoroughly *boiled* for half an hour. It is better to use pieces of old cloth which may be burned. The cloths or handkerchiefs should not be tucked under a pillow or into the pocket, nor allowed to lay aside and dry and then shaken out to use again, as this throws the organisms into the air. A small bag made of cloth which can be boiled and washed may be used to hold the cloths until ready to disinfect or burn them.

No person having consumption should spit upon the floor or street.

No mother with consumption should nurse an infant, and children ought never to be taken care of by a consumptive patient.

In case any renovation of the premises is possible or desirable the department will attend to the same when the local board of

health is unable to do so, upon notification from the physician that this is desired.

This system of investigation is the one which has been found to be of value by the New York City Board of Health, which was the first to introduce this method of control of consumption. To this department we are indebted for the forms of several of the circulars of report.

Sputum collection bottles and culture tubes for the examination of the secretions in suspected cases of diphtheria may be obtained FREE from any of the following named pharmacists:

[Here followed a list of forty-four registered pharmacists with their addresses.]

ANTI-DIPHTHERITIC TOXINE.

An opinion as to the value of the application of serum therapy was daily asked for by the medical profession and the laity.

Theoretically and practically this same thing has been practiced with other diseases which are known to be dependent upon the presence of and the growth of, micro organisms in the system. Anthrax, in animals, in France and Germany, has been controlled by this means. Tetanus, swine plague and pneumonia to a limited extent, and also in a manner or way not yet demonstrated bacteriologically, the diseases known as hydrophobia and small-pox.

Tuberculin is cited as a failure of this method, but it must be remembered that tuberculin did not fail to act upon the disease which it was intended to attack. It does not fail in producing reaction in most States where it is used for diagnostic purposes in tuberculous animals. Its failure was, in not producing the results which were claimed for it by an enthusiastic public and medical press.

It has served, however, as a lesson to us in accepting this new production with care and conservatism. The results such as they are will be better understood.

Before condemning or accepting this seemingly new means for treating these various diseases, let us consider the rationale upon which it is based.

In the early history of the study of bacteriology, it was noted in the laboratory growth of the various organisms, in liquid, as well as cultures on solid nutrient media, that certain organisms would outgrow others. Evidently this was not always due to the colony from one organism absorbing or reducing all the nutrient media in the vicinity, neither from overgrowing or overlapping of the

more vigorous growth. The stronger growth would at times grow up to and around the weaker or less opulent growth. It was also observed that certain organisms made colonies of only a small area, being limited in their extension.

Further investigation by chemical analyses and by separating the organisms from the fluid in which they had grown, showed that there had been a certain product evolved while this organism had been growing, and which appeared to have the power to check the growth of the organism which had produced this material, or poison, and was also able to check the growth of or destroy the other organisms when brought into contact with the newly formed poison.

It was further discovered upon closer examination that at the period when the growth of the organism was checked, there had been an entirely new product evolved from the toxine. This material had the power to neutralize the action of the toxine and by itself to check the growth of the organism from which it has been evolved.

This same operation takes place in the making of vinegar, or in the fermentation process by which alcohol is evolved. In the one case an acid is made by the action of the organism, which then checks the further growth of the organism, whereupon the cloudiness of the vinegar ceases and the organisms and detritus fall to the bottom leaving the fluid clear. In the production of alcohol the fermentation process goes on until a certain percentage of alcohol is produced which checks the fermentation by checking the growth of the organism. So alcohol used in the same way can be used as a preservative against fermentation, or as it is otherwise called, decomposition.

It was further discovered in laboratory working that an animal would acquire immunity from the action of these organisms which had previously received gradually increasing doses of the organisms themselves or even from the toxines produced by these organisms.

It is the reproduction of this process that is made use of in the production of the so-called "diphtheria anti-toxic serum."

In brief the method of production of the material is as follows:*

* Probably the best detailed description of the method may be found in the Abstract of Sanitary reports issued by the U. S. Marine Hospital Service, by Dr. Kenyoun, giving the results of his experiences and observations in both the French and German laboratories.

A pure culture of the Klebs-Lœffler bacillus is grown in a sterilized bouillon medium for about three weeks at body temperature. During this time the toxine produced by this organism becomes greater in quantity. This toxine is more rapidly formed when the growth of the organism is stimulated by the constant introduction into the culture fluid of a fresh supply of oxygen. This is done by exhausting the air in the flask and allowing a fresh supply of sterile air to enter. The organisms then appear to have taken on fresh vigor which increases the amount of poison.

This solution is allowed to grow until it has attained such a strength that one-tenth cubic centimetre of the solution will kill a guinea pig of 500 grams weight in 36 to 48 hours. This is called a normal toxine solution.

The anti-toxine solution of serum is made through the use of animals, the horse being preferred to other animals on account of size and also the natural resistance to the poison, other animals succumbing more readily during the process of immunization.

With a syringe a small quantity of the normal toxine solution is injected beneath the skin of the animal. This is followed by a reaction or rise of temperature, which passes off in twenty-four hours. The operation is then repeated at intervals of about a week, gradually increasing the dose until the animal receives, after several months treatment in this way a large amount of the normal solution without any consequent reaction. From the jugular vein there is then drawn a portion of the blood of the animal, under antiseptic precautions. Nine-tenths of a cubic centimetre of the serum obtained from this blood is mixed with one-tenth of a c. c. of the normal solution and the whole injected into a guinea pig of 500 grams weight. If the animal dies the anti-toxic serum is not of sufficient strength. If the animal survives, the horse has been satisfactorily immunized or rather the serum from such a horse is of standard strength, and can then be dispensed or used in cases of known or supposed diphtheria, with the possibility of neutralizing the toxic products which have been produced in the system by the growth of the Klebs-Lœffler bacillus in the throat of the patient, and which being carried by the blood to all parts of the body, is affecting unfavorably the functions of the system in a manner similar to the ingestion of any organic or chemical poison.

There are at present writing but three sources of the material for commercial supply, namely: that coming from the manufactory of Behring, that from Schering, both of which are located in Germany and the third is from the Pasteur Laboratory, or, as it is now called, the New York Biological and Vaccinal Institute of New York City. For the past two months this latter has been the only available supply in this country. While this laboratory is under no state or sanitary control, being a private enterprise, or originally established for the treatment of rabies, yet the gratifying experience of the users of this material in Boston and elsewhere, is a sufficient guarantee that the material is a standard one.

Owing to the scarcity of the material the control has fortunately been possible in the disbursement thereof. The agents of the Pasteur supply, Mess. Lehn and Fink, have very intelligently and scientifically permitted the material to be supplied to only such physicians as were known to be reliable, and wherever practicable only through boards of health or their order.

This was desirable for many reasons. In the first place the material could be held at a known centre instead of being distributed about. Thereby actual cases were not allowed to go without the treatment while it was held in reserve at various points in the hands of a large number of physicians who had no actual cases.

In this State there has been a certain amount of control in this way. In the city of Providence the material was to be obtained from a prominent druggist who obtained the supply through the orders of either the local or State Board of Health.

This was to be obtained by any physician upon order of the Superintendent of Health of Providence, or the Secretary of the State Board. In this way no suppositious case was treated without a full knowledge of the circumstances and in all actual cases a perfect history and study of the cases could be had and collected together for useful scientific data and for use in the future administration of this material. Should it be thrown upon the market by all druggists and by all manufactories, as is about to be done by a New York firm representing the Behring, not only spurious articles would be manufactured, but by failure in the administration of the perfect material by inexperienced and unprincipled physicians, a remedy which may prove itself of great value might be lost by lack of confidence.

In order that this might not be the case and to make the material available to all cases deserving, whether rich or poor, the

State Board of Health and the Board of Health of Providence offered to supply the material to those who were unable to pay for the same, believing that aside from establishing a scientific investigation of the subject, that from a hygienic point of view the expense was well assumed if it shortened the duration of the disease and removed as early as possible a centre of infection, and if a cure was effected where death might have ensued that the mortality rates would be improved and lives of future value to the community might be presrved.

In the application of this material a syringe of a capacity of twenty-five cubic centimetres is the most desirable one, inasmuch as a single dose may be twenty c. c., and in an actual case should not be less than ten c. c. The syringe provided for this purpose and called a Pasteur syringe, is the same thing as an ordinary Pravaz aspirating syringe, having a strong rubber piston packing. The Koch syringe used for this work is the same form as the ordinary one cubic centimetre syringe which has been in use heretofore, being a glass tube with no packing, the suction coming from a removable rubber bulb at the head of the syringe. This holds, however, but ten c. c., and must needs be filled twice and two punctures made in order to give the required dose in most cases. This has its objections in the case of a refractious and weakened child.

As these syringes were not possessed by each practitioner the boards of health referred to offered, in any given case, to administer the first dose to the patient themselves and then to loan the syringe to the attending physician until the case was over. This permitted no delay in obtaining the material or the syringe, and as has been demonstrated in many cases was the only practicable way to deal with the question.

Many health boards of other States and cities have become sufficiently interested to commence the propagation of the serum for their own use, by special appropriations.

At the present time the city Board of Health of New York city has a large numer of horses immunized, and within a few days the strength will have attained the standard of the foreign material. This work, under the direction of the bacteriologist of the Board, Dr. Hermann Biggs, has commenced its work under private financial encouragement, awaiting the probable appropriation of $30,000 to be made by the municipal government of that city.

The State Board of Health of Massachusetts, the City Board of Health of Brooklyn, and the Marine Hospital Service, located at Washington, D. C., have all a number of animals immunized. The amount of material which will be made available by these different departments will probably not be greater than the local demand, for some time to come. It will be necessary, therefore, that localities having so small a population as not to warrant the establishment of a plant, must depend upon a commercial supply until one or more of these boards shall have enlarged its plant, which will necessarily follow. This source will be more desirable since the confidence will be more readily accorded to a known neighboring health board than to a source which may at any time fluctuate as to quality from financial reasons.

The techique of the application of the material is similar to that of an ordinary hypodermic injection, but owing to the amount injected, it, at first experience, seems to be rather a bold procedure. The method found most easily applied by the writer is as follows:

The syringe having been previously sterilized before coming to the patient, either by washing out with a solution of carbolic acid five per cent., or, in absence of that, several washings with boiling hot water, is held in the right hand with needle already attached in order to dip down into the bottle.

The bottle is held in the left hand and the syringe in the right. The needle is dipped down into the bottle and the piston of the syringe withdrawn by pressing with the thumb against the cylinder of the syringe and the rest of the hand drawing the piston out. In this way a steady traction can be made and there is less liability of blunting the needle or of spilling the fluid than if the bottle is held by an assistant.

As the syringe piston rod is marked in reverse, the largest number, 25, being near the handle, the reading will be the amount less the amount desired to be used.

The point of injection which has been found preferable by the writer, and as practised by the French authorities, is beneath the loose skin in the side, anywhere in the space between the axillary and mammary line, at the line of the waist. This is preferable to the space between the shoulder blades on the back as the skin there is very much thicker, and the pressure on the fluid must needs give greater discomfort. It is preferable to the German point of selection, in the buttocks, as there is greater mobility of

the part. The point recommended is at a point, where, as in the case of a refractory child, there is less motion than at any other part of the body.

A fold of the skin is gathered up between the thumb and forefinger of the left hand, the skin having been previously washed thoroughly with bichloride solution of 1-1000 or carbolic solution five per cent., or, when that is not available, hot water and a clean handkerchief, towel or cloth. The syringe filled with fluid and the air excluded, is held at the base, or needle connection, by the thumb and first and second finger of the right hand, and the needle inserted beneath the skin with a steady forward motion, penetrating the cellular tissue, and avoiding the skin and the muscular tissue. The left hand then holds the base of the syringe for a moment in order to slip the right hand up to the piston handle. With the left hand the skin is again pinched up and fluid inserted slowly, while at the same time a larger area of skin is gathered up with the left hand, thus allowing a larger pocket for the serum to flow into. Upon withdrawing the syringe the forefinger of the left hand is held for a moment over the needle wound to prevent the serum from flowing out again from the pressure within. This procedure produces a swelling or bunch the size of two English walnuts, which subsides in about half an hour, leaving for the time being no after effects, locally. It sometimes occurs that a local eruption may occur at the site of the injection later, and sometimes a general erythema or urticaria may follow even as late as a few days after the injection. It has not yet been determined whether this is the result of the action of the preservatives used in the solution which, with the German productions is carbolic acid, and with the French a small piece of camphor, which will be found in most all bottles.

After the injection, in some of the severe cases, the patient appears to be more somnolent, which condition passes away in about eighteen hours.

It may appear unnecessary to describe the technique so minutely, but if the operator is prepared with means and method before commencing, he will administer the material with greater rapidity and less annoyance to the patient, a thing of considerable importance in the case of a child who is already quite weak from the action of the disease, and furthermore it is of assistance to those whose experience with the use of a hypodermic syringe has not yet been fully established.

AMOUNT OF TUBERCULOSIS IN PUBLIC INSTITUTIONS OF THE STATE.

With a view of ascertaining the amount of tuberculosis existing and which was cared for by the various institutions of relief and detention in this State, the following circular of inquiry was sent to all the known hospitals and homes throughout the State:

1. Are cases of consumption admitted into your institution?
2. If so, how many do you entertain annually, and how many are on your files at the present time?
3. Are these cases in the same dormitories or wards with other inmates or patients?
4. How many other inmates in these wards?
5. Do these patients expectorate into wooden, paper or covered receptacles?
6. Are cups, cuspidors, handkerchiefs or rags used to receive the sputum?
7. Is any disinfectant kept in the receptacles used for the sputum?
8. What disposal is made of the contents of the receptacles and of the handkerchiefs or rags?

Answers were obtained from thirty different sources, from which the following deductions were made:

From answers to question one it was found that there were but thirteen institutions which regularly admitted tuberculous patients: of these four were hospitals, four were poor farms, two homes for adults, State institutions one, and two others. Homes for children did not admit cases, although a case might develop after admittance.

Answer 2. It was determined that in 1893 there had been 114 admitted into the four hospitals and two existed in homes for children, and 128 at the State institutions, which includes six separate departments. The number remaining at the present time did not amount to over twenty-three, including the two children mentioned.

Answer 3. In two of the four hospitals which admitted these cases, the cases were isolated from the other patients. In one isolation was practiced in cases where the disease was somewhat advanced. In one no isolation was attempted, probably from lack of accommodations. Two of the four poor farms practised isolation, two did not. At the State institutions the patients are retained in the same wards or dormitories with other inmates or patients.

Answer 4. In the poor farms where no isolation was used the number of inmates exposed to the cases was not given, since they had no cases on the records at present.

In one hospital where isolation is not insisted upon, there was an average of twelve patients in each ward. In another an average of forty-four exposed to the disease. At the State institutions from four to thirty.

Answers 5 and 6. Tin cups were used to receive the expectoration in one institution. Graniteware cups with metal covers in three. Earthenware cups or mugs in seven, paper cups in one, making a total of twelve in all where cups were used instead of cuspidors, although cuspidors or spit-boxes may be used in three of these institutions at times.

Rags were used instead of handkerchiefs in eleven institutions. In the other two which were hospitals, no mention was made of the use of either rags or handkerchiefs. In one hospital the use of handkerchiefs is *forbidden*.

Answer 7. Disinfectants were used in connection with the sputum cups in all of twelve cases. In three chloride of lime was preferred. Bichloride of mercury 1 to 1000 in one case, the same in strength of 1 to 500 in one instance, phenyle in one, carbolic acid 1 to 40 in one and 1 to 20 in another.

Answer 8. Disposal of the sputum was by emptying into the water-closets in nine cases, and burned in one and buried in one.

Of the rags, they were burned in nine instances and buried in one; burned, if too bad to wash, in one.

The result of this investigation is extremely gratifying, for it shows first that in all public institutions the disease is regarded as one that is communicable and that close care of the sputum is the object which receives the most attention.

As to which of the many methods are best, may to some extent depend upon the conditions present and available.

As to isolation of the case it is not considered by some as necessary during the first stages, and not until the case is well advanced and the expectoration is profuse.

The disease being a communicable one is dangerous in all of its stages, and probably the care which will be exercised by the patient in the earlier stages will be less as regards drying of handkerchiefs; and handkerchiefs will be used more commonly in this stage than later.

Inasmuch as all patients in hospital wards and those whose

debility or misfortune has placed them in institutions of relief are always in a poor condition to resist the entrance of organisms of any kind in the system, it would seem desirable that all cases of consumption in presence of large numbers of people should be isolated no matter how little the disease has progressed.

The requirements are not so urgent in private families where a fewer number are congregated, and where the people exposed are in robust health.

As to preference of cups, mugs, etc., for receiving the sputum, the graniteware cup with the cover would seem to be preferable to the earthenware mug, from its lightness in handling and the non-liability of breakage, which would add to the expense. In institutions where there are few numbers of cases, or where the patient is confined to the bed, or is old and feeble, the paper cups or boxes such as are used in one institution in the State are preferable. These are inexpensive, very light, and are destroyed by burning, and do not require to be washed. From an æsthetic view they would be preferable to the graniteware cups, as they are less offensive to the sight.

As to which disinfection may be used opinions may vary somewhat.

While chloride of lime may be as effective in its germicidal action as any of the disinfectants, yet its odor precludes its use. Bichloride of mercury or corrosive sublimate solution is condemned by some authorities, inasmuch as it coagulates the mucine and albuminous matter, not only of the envelope or tissue of the organism, but also the masses in which the organisms are floating or are imbedded. This has been obviated by some by adding a certain amount of caustic potash solution to the disinfectant used, especially when the sputum is thick and tenacious.

Carbolic acid is claimed to be the most efficacious, but on the other hand it is claimed by some investigators that carbolic acid does not destroy the organism completely but merely inhibits the growth of the same. That it does not destroy the spores of the organisms does not hold, as it is presumed that bacillus of tuberculosis does not form spores.

Carbolic acid is not especially agreeable in its odor to most people and is suggestive of something decaying and which is being disguised or covered up.

Inasmuch as the moisture is the main thing to be relied upon, bichloride of mercury 1 to 1000 should meet with the requirements

of the case. The State Board of Health of Ohio recommends the addition of an acid, inasmuch as all disinfectants are more germicidal in an acid solution; using in this case hydrochloric acid two oz. with one drachm of corrosive sublimate to the gallon of water.

While germicides may be more effective in an acid solution in sputum which is thin, yet in a thick, mumulous or tenacious sputum it would seem more desirable that a solution of caustic potash should be united with the disinfectant in order to disintegrate the sputum. Yet without further research it cannot be said positively which is preferable. The Board will endeavor at an early date to carry out a series of experiments to determine the question.

Taking it for granted that cupidors, sand and saw-dust boxes are not used in these institutions to receive tuberculous sputum, the greatest probable source of danger is not from the spit cups but from the dried sputum which is flicked off into the atmosphere from handkerchiefs or rags.

The use of handkerchiefs should be interdicted; old cloth is plentiful in this latter day, and pieces of rags only should be used by those who are either too weak to make use of the expectoration cup or who are away from their accustomed places. These rags *should not be laid aside to dry, nor tucked under the pillow nor into the pocket* until washed again. The pieces should be sufficiently small for one using and then should be placed in a receptacle of some kind, so that they may not be exposed to the air until placed in some disinfectant or burned. A little washable cloth recticule or bag with draw string is sometimes used. This can be kept in a convenient place by the bedside and into it all contaminated pieces of cloth should be placed immediately after using.

The best disposal of these cloths is by burning. Such clothing as cannot be destroyed and has become soiled should be thoroughly boiled for one hour. This is safer even than placing them in a disinfecting solution alone.

Discharging the sputum into the water-closet, if there is sufficient flush, will destroy the organisms, for the organisms of decomposition, which are sufficiently numerous in waste-pipes, will destroy the specific organism in a very short time. Care should be exercised, however, that none of the sputum, even if associated with a disinfectant, should be allowed to fall upon the sides of the hopper or closet, there to become dried and then wafted into the air.

HUMANIZED OR BOVINE VIRUS.

The query has been raised among the laity as well as among the medical profession as to the preference in the use of a humanized virus for vaccination against small-pox, or bovine virus. It has been suggested by some as an argument against the use of humanized virus that there was a danger of carrying with the virus some other disease existing in the person from whom the material was taken. This might under most favorable and an unusual combination of conditions, be possible in a country where disease was prevalent or where the vaccinator was ignorant of disease or of cleanliness. But in obtaining this material in an enlightened country it is not to be supposed that the vaccinator is going to gather his material from any and every source that presents itself, and especially from persons or children who have the slightest indication of anything but the best of health. If a child has any latent disease which is communicable, it is pretty sure to show itself in a prominent manner by the time the vesicle from which the material is to be taken, has reached its proper form for revaccination to another. If such a condition presented itself, or an eruption should appear, no material would be taken from such a case. Fortunately healthy children are in the majority and the vaccinator is not forced to take everything that is presented to him.

In favor of the bovine virus it may be stated that the virus is somewhat more active in its action, it is obtained from animals which are known to be perfectly healthy and proper care is taken in charging the points with the virus to preclude the possibility of introducing foreign matter, such as dirt with its accompanying pus producing organisms.

It may be of interest to know that this subject has been investigated recently by a committee of physicians appointed by the Norfolk County Medical Society. The committee investigated only those bovine farms which were in the vicinity and which were supplying the most of New England.*

Inasmuch as the State by its laws requires compulsory vaccination, it should be the duty of the State, as far as possible, to guarantee to the recipients of the vaccination the use of only such virus as is pure.

* Boston Medical and Surgical Journal, Nov. 2, 1893, pp. 133 and 162.

As this material is obtained from different localities, and is produced by the manufacturers from a commercial standpoint, and while usually under the supervision and control of competent medical men, yet a board of health of any State should not allow this material to be sold within its jurisdiction unless the methods of its production have been personally inspected, and are found to be in every way satisfactory to the board.

Wherever the laws do not admit of a control of drugs and poisons, a public statement as to the opinion of the material offered for sale should be made.

In view of this opinion the Secretary of the Board has recently made inspection of the following vaccine farms in the immediate vicinity.

New England Vaccine Co., Chelsea, Mass., Dr. Wm. C. Cutler.

The offices of this company are located at 294 Broadway, Chelsea, and the stables are located in Everett street, away from the thickly settled portion of the city. The stables were built especially for the purpose for which they are used and consist of two large high-studded apartments. The one used for the stable has cemented floor, a mop-board of wood rises to the height of four feet, the rest of the walls are hard finished and painted · the stanchions are of hard wood and iron piping. No straw or bedding is used. A cemented depression of the floor, or trench, a foot wide and a foot deep is located behind the animals, and all droppings fall into it; numerous faucets and a line of hose permit of frequent, thorough flushings.

In the vacciuating room the floor is of cement; the walls glazed tile for six feet, and the rest of the room hard finished and painted. The intention of perfect cleanliness is manifested in the equipment. The whole is heated by steam.

The animals are selected and examined by a veterinary surgeon, a certificate of health being issued to each one by number before being treated. The animal is tagged with this number and the points charged take the same number. It is the intention that this tag shall not be removed until the animal is killed, thus a complete record can be kept of the whole proceeding in each animal, and if when slaughtered it is found to be diseased, the points bearing that number can be destroyed.

The animals preferred are not under one nor over four years of

age. It is frequently difficult to obtain as many heifers of the proper age as is necessary for the supply.

The point of vaccination is selected on the buttocks on both sides. This is preferred to the abdomen on account of non-liability of rupturing the vesicle when lying down and on account of greater cleanliness of the parts.

The area of such scarification is about the size of a silver dollar. Large scarifications are preferred on account of there being less tension in the vesicle, and the walls of the vesicle being held more firmly to the true skin by numerous trabeculæ.

The serum is taken from the vesicle at about the seventh day. This is a matter which depends more upon the progress of the lesion than any limited time.

When the lesion is ripe or in a suitable condition, the crust is cut or scraped off, leaving a raw surface which at first has fine, small, bloody points, and some serum. This with any particles of the remaining crust are *sponged* off with clean sponge and water. After a few moments the virus exudes and is taken direct upon the ivory points by touching the tips of the points to the exuding serum on the wound.

The points are handled with the fingers of the operator and are placed on metal trays in a gauze wire cage, to dry. When dry they are again dipped, it being considered that the second coating protects the first to a certain extent.

The ivory points are sterilized before being used by long continued boiling.

When all points are charged and dried, they are placed in glass jars, labeled with the number of the animal from which they were taken and forwarded to the office of the company, where lady assistants remove all particles of extraneous matter and exclude all imperfect points before packing for shipment.

Large ivory points are charged with the first oozing from the wound, and although they may be stained with some blood they are preserved and used as seed points for vaccination of subsequent animals. Although all clean crusts are preserved for a time as a precaution against the failure of the seed points, yet none are sold.

Colman and Shurtliff Farm

Is located at Stoughton, near Canton, Mass., and is under the supervision of Dr. D. C. Rose, who personally examines each ani-

mal before vaccination. The inoculating room and stanchions are located in a barn in the country. The animals are allowed the advantages of an adjoining field until the vesicles are fully formed. They have the advantage of plenty of air and freedom from restraint during the incubation period. The animals are bedded with clean straw, and all droppings are swept through a shoot, and by means of wooden troughs below the floor, all urine and floor washings are removed at once.

The vaccine scarifications are made by preference on the lower or posterior part of the abdomen, or upon the abdomen and buttock of only one side. The size of the scarifications are made not larger that a quarter of a dollar. Heifers not older than one year are selected for the work.

The charging room is perfectly clean, free from dust and very dry.

A special point is made in gathering the virus after the removal of the crust, in allowing the oozing serum to trickle into small glass cups especially prepared for the purpose and holding about a teaspoonful. Any extraneous matter, such as epithelial scales or bits of crusts thus have an opportunity to precipitate before the points are dipped. Being dipped they are allowed to dry on clean glass plates. In spite of indignant demands of the medical profession for a supply of crusts from this source, none are sold as in former years, the management believing that the danger of pyogenic infection was thereby increased.

Humanized Virus.

The largest number of cases which are vaccinated at the public expense are in the city of Providence. Both bovine and humanized virus is used. The supply of bovine virus is obtained from the N. E. Vaccine Co.; the humanized supply is under direct control of the Health Department and has been for thirty-eight years, the material being propagated in a direct line from the original imported stock.

The virus is gathered by the vaccinating physician of the department, Dr. Charles H. Leonard, and is taken from only such children as present an appearance of perfect health and whose parents are likewise found to be healthy.

Material in some cases is taken on points or quills, but the most of the material is preserved in the form of crusts. This, in the form of a powder, is mixed with tap water and a little glycerine.

It is customary to make three scarifications upon the left arm, the area being about a dime size.

No attempt is made to clean the arm before applying the virus, which is applied with the same spatula that has been rubbed upon the arm of the next preceding case.

That the virus is pure and that the danger of mixed infection from arm to arm is small, is evinced by the uniform favorable results, not only in the successful production of typical vesicles, but the freedom from violent results.

The use of humanized virus is preferred by the department, since from its experience the point of inoculation became less violently inflamed than with the bovine virus.

Other sources of supply are being examined and will be reported upon in subsequent issues.

INSPECTION OF SUMMER HOTELS.

During the summer of 1887, an unfortunate accident happened at one of the numerous summer hotels in this State, whereby a large number of the guests were made alarmingly ill, and one or two died. Upon investigation it was discovered that the main water supply was not adequate to the needs of the hotel and that a second and unused well had been used to supply the deficiency. This well was located in the cellar of the hotel, and through this part of the hotel the drainage of the whole waste system passed. After the sickness began to appear the examination of the plumbing system revealed the fact that a portion of this drain had become displaced, permitting the wastes to have direct flow into the well. This supply was used for drinking purposes and although a difference in the character of the water was noted yet not sufficient attention was given to the suspicion by those in charge to condemn the supply and procure another.

As a result the hotel was deserted by the guests and closed. Immediately a thorough system of plumbing was put in and what should have been done before the accident was now done at great expense, and an unquestionable water supply was obtained, away from the hotel and free from any possible source of contamination.

Had this precaution and expense been accepted as an essential to a properly equipped hotel, assuming the responsibility of the health and lives of the guests, at the beginning of the season, no such occurrence could have taken place.

As a result of the popular demand and the recommendation of the State Board of Health, and by the efforts of the late secretary, Dr. Fisher, a bill was passed at the following session of the legislature which provided for the inspection of hotels under certain conditions.

The text of the statute is as follows:

An Act for the Protection of the Health of the Patrons of Hotels and Boarding Houses.

[Passed March 22, 1888.]

It is enacted by the General Assembly as follows:

Section 1. The state board of health shall cause upon the request of the owner, agent or lessee, or upon the request of the town council or health officer of any town wherein the premises are situated, an examination of such buildings and premises connected therewith, as are or may be used in this state for the board and lodgment of visitors or other boarders, and furnishing accommodation for ten or more of such persons at one and the same time. Such examination shall be made under the direction and supervision of the said board, and by employés under its appointment, and whenever, or as soon as may be after, such application may be made.

Sec. 2. The said employés, or sanitary examiners so appointed, shall ascertain the source and sufficiency of the water supply, the quality of the water, the modes of conveyance, introduction and storage, the methods of removal of waste water, slops, excreta, house refuse, garbage and all putrescible matter of whatever kind, the ventilation available, the means of preventing fire and modes of safe escape in case of fire, and such other conditions as the said state board of health shall require. The said examiners shall receive for such service, a sum not exceeding five dollars per diem, with their traveling expenses.

Sec. 3. Upon the receipt of the report of such examination, the state board of health shall authorize the secretary of the said board to issue a certificate, certifying in detail to the sanitary and other conditions of the examined premises, in accordance with the examiner's report, and said certificate shall be placed by the managing occupant of such premises, in a safe and conspicuous place, where it may be easily seen and read by all persons, guests, or patrons of said premises, and the said managing occupant, upon the destruction or defacing of such certificate, shall immediately procure another of the same purport, to be placed in a like conspicuous position, and the said secretary shall be paid the sum of two dollars by the owner, agent or lessee of such premises, for each certificate so made out.

Sec. 4 Every owner, agent or lessee of any building used for the purpose of providing board and lodging for the entertainment of guests, to the number of ten or more, who has obtained a certificate as provided in the section next preceding, may present the same as evidence in his defence in case of a suit for damages on account of personal injury from alleged unsanitary premises; and every owner, agent or lessee of any building opened for the purposes aforesaid, who

has not had or requested such sanitary examination of such buildings and premises connected therewith, as provided in this chapter, shall be liable for damages for such neglect, and, upon complaint made of such owner, agent or lessee, by any guest, boarder, or other occupant, or by the town health officer, and if upon trial it shall be proved that any removable unsanitary condition existed within such premises at the time of making such complaint as did endanger the health of the guests or occupants of such premises, such owner, agent or lessee shall be fined, or imprisoned in the discretion of the court trying the same.

SEC. 5. Any bills for printing or other expenses incurred in the enforcement of this act when certified by the chairman of the state board of health and approved by the governor, shall be paid from the state treasury upon order of the state auditor, and all acts and parts of acts inconsistent herewith are hereby repealed, and this act shall have effect from and after the first day of April, 1888.

It will be observed from the reading that this law provides for inspection only when requested by the occupant or owner of the premises or by request of the town council or health officer of the town wherein the hotel is located. While a certificate of inspection stands as an *assistance* in any action against the landlord or owner, yet no penalty is attached to lack of inspection. The conditions of the law should provide for a compulsory examination of the premises of every hotel soon after the season has opened annually, or as soon as all the conditions of supply are working at the average, and also at such times as may seem necessary on the part of the State Board of Health, under such conditions as a light rain fall or a sudden failure of the town or main supply.

This State has large sums of money invested in this industry, of entertainment of summer visitors, annually accommodating upwards of 5,500 at Block Island and Narragansett Pier alone, and carelessness upon the part of one hotel is apt to react upon all the others. An accident, either from poor water or milk supply, or by lack of attention to fire escapes or fire extinguishing facilities is apt to be shown up in intensified colors by the public press, and would-be visitors from other States will condemn all the hotels at Narragansett Pier on account of some accident at a hotel at Block Island, for both are in Rhode Island, and geographical limitations are apt to be confusing at a distance and when so small a State as this is under consideration.

All hotels should be alive to this fact and not only endeavor to see that their own premises are above suspicion but to discountenance any negligence of any sanitary matter in any other hotel, be it small or large. While there may be more or less rivalry, yet it should be remembered that in this respect their interests are

identical, and the failure of one means the injury of all the others to a greater or less degree. The proprietors should also observe the advantages of the enforcement and improvement of such laws as this one, as an advertisement, as it shows their guests that the main provision for their care has been considered; that not only will they be supplied with pleasant lodging and ample food, but that the quality of the food and the surroundings under which they are to reside are of the best.

A promulgation of the fact that this attention is given by the health authorities to people intending a visit to the State, will serve to assist them in making a selection for the summer as against another resort where matters of this kind are not considered.

Under this law in the summer of ——, the writer was employed by the Board to examine the hotels at Block Island and Narragansett Pier. Eleven hotels were examined at the former place and fifteen at the latter at that time as also one at Wickford. Since then a few other hotels at other places have been examined by the Secretary of the Board as occasion offered; but no regular annual inspection has been attempted.

Under these conditions, deeming it to be desirable that a system of inspection should be inaugurated that might in time be improved and lead up to the full requirements of the case, the Secretary with the sanction of the Board has this summer made a thorough inspection of all the hotels at Block Island to the number of twenty-three, and at Narragansett Pier to the number of sixteen, and two at Jamestown.

In this inspection attention was given more especially to the water, milk and ice supples, while the sanitary surroundings of the hotels, as well as the plumbing and drainage, received consideration. The available fire extinguishing appliances and means of escape in case of fire were also inquired into.

The examination at Block Island showed a recognition of and attempt to maintain, perfect sanitary conditions, especially among the larger hotels. The smaller hotels showed at times some negligence in attention to cleanliness of surroundings.

The water supplies were varied; some coming from the town supply, while others were dependent upon a local well or spring. In some of these latter cases, while the conditions at the time of inspection did not warrant the discontinuance of the use of the supply, yet conditions which might contaminate the supply were

possible, and such wells should be abandoned as soon as a purer and more reliable supply can be obtained.

At Narragansett Pier the most exact and careful attention was given by the town authorities, aided by the Ladies Sanitary Association of the place. Perfect cleanliness of the streets and surroundings of the hotels was observed. The introduction of the sewerage system through the principal streets of the town has caused a decided improvement in the means of disposal of wastes from premises, and has produced a marked change in the character of the plumbing of the hotels. While at the original inspection, good lines of plumbing were to be found in nearly all cases, yet at the present time the old forms of pan closets and outside privies have been supplanted by the introduction of the improved wash-out closet. Several of the hotels had given especial attention to provisions against fire, many of them having provided abundant fire escapes and others having placed hydrants connected with the town service, and provided long lines of hose.

It would seem desirable that all these hotels should be provided with every means of controlling fire as well as making every endeavor to assist their guests to escape in case of fire. Usually in a strange place the visitor is confused even under ordinary conditions and when excitement of an alarm of fire is added, it is sometimes impossible for the coolest to find a means of escape, even when it is directly in front of them. If suitable and numerous fire escapes were provided in all cases, and numerous signs of direction placed in the corridors, with red globes on the lighted gas fixture so marked, and placed at the points of escape, it would add very much to the security and comfort of the guests although the occasion to use the same might never arise.

These caravansaries are only wooden structures with large hallways providing a natural draught for the flames if once started, and the loss of one hotel especially at Narragansett Pier would in many instances mean the loss of more than one if a high wind were present to assist.

Already the need of such appliances has been shown, and the provision of fire hose with good pressure and cool heads prevented what might have been the loss of several hotels and stores.

An inspection of the local fire department at Narragansett Pier showed a well-organized and intelligent corps of two companies with several hundred feet of hose and ladders. If to this could be added one or two medium sized chemical engines the town as a

whole might feel quite secure. The hotel proprietor does not always greet the fire laddie with open arms when his stream of water is copious, for fear of more damage by water than by fire; yet the rule of experienced fire marshals is, that plenty of water as soon as possible, is usually the safer plan. A chemical engine makes the difference between the two extremes, as it is more under control, does not require a great amount of liquid for extinguishing, and is more readily available.

It may be asked by some, what has the Board of Health to do with the fire department? The health of the people is influenced by other conditions than impure air, or impure water. Unsafe bridges, poor gas supplies, whether from danger by escapement of the gas or by the poor quality, causing defective eyesight, are also things which should receive the attention of health departments, and surely the loss of life by suffocation is one of the most essential things for consideration.

The town supplies of both places were analyzed and both found to be chemically and bacteriologically pure, although the supply of Narragansett Pier being somewhat discolored by woody matters is not much used for drinking, but is considered invaluable for the protection against fire which is offered. Were this water filtered by mechanical, or other means of filtration, the taste and color would be changed so that it would be more acceptable to consumers for drinking purposes.

Several of the hotels derive their source of drinking water from a copious spring which is found on an elevated part of the town, and which gives a free head or pressure, sufficient to supply the outlets by gravity when raised by pumping a few feet.

The source of the supply is kept isolated from contamination, and although no analysis of the water was made, yet the origin and surroundings would indicate that it should be a pure supply.

It is to be hoped that by next summer still more attention to these details will be given, and it is the intention of the Board that all the hotels on the south shore to the State line shall receive inspection.

Result of Examination of the Water from Sands Pond, being the town supply of Block Island.

(All figures parts per 100,000).

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.
								Albuminoid.						
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.	
1894. Aug. 1 *	None.	Slight Flocculent.	.00	18.8	.2	18.6	.0013	.0055	.0050	.0005	5.	.25	.00	4.22

* Sands Pond was at this time the lowest at which it had been for a number of years.

Result of Examination of Water taken from the Parks Water Supply of the City of Newport.

(All figures parts per 100,000).

Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen.		Hardness.
								Albuminoid.						
	Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.	
1896. Aug. 1	None.	Very Slight Flocculent.	.0025	9.4	1.9	7.5	.000	.024	.024	.000	2.5	.00	.00	1.92

Result of Examination of the Water at the State Camp, Quonset Point.

(All figures parts per 100,000).

Place of Collection.	Date of Collection.	Appearance.			Residue on Evaporation.			Ammonia.				Chlorine.	Nitrogen		Hardness.
									Albuminoid.						
		Turbidity.	Sediment.	Color.	Total.	Loss on Ignition.	Fixed.	Free.	Total.	Dissolved.	Suspended.		As Nitrates.	As Nitrites.	
1 Main well......	July 5	None	Very slight.	0.00	4.14	.29	3.85	.000	.014	.014	.000	1.85	.114	.000	1.318
2 Cavalry stables*	July 5	None	Consid. sand.	0.00	3.28	.21	3.07	.000	.005	.005	....	1.57	trace	.000	.885
3 Impounded spring........	July 5	None	Very consid. rusty.	1.25	7.57	1.57	6.00	.0132	.019	.017	.002	1.29	trace	.000	2.14

* Drawn soon after re-driving the tube or pipe.

Contagious Diseases Reported in 1894.

TYPHOID FEVER.

Cities and Towns.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Barrington	..	..	0	0	0	0	0	1	0	0	0	0
Bristol	1	0	4	0	0	0	0	1	1	2	3	0
Warren	0	0	0	2	1	1	0	1	1	1	1	0
Coventry	1	..	0	0	0	0	0	9	1	..	..	..
East Greenwich	..	0	0	0	0	1	0	2	4	0	0	0
West Greenwich	..	..	..	..	..	..	..	..	..	..	..	..
Warwick	0	0	3	1	0	0	0	3	..	17	0	0
Jamestown	..	..	..	0	0	0	0	0	0	0	0	..
Little Compton	..	..	..	..	..	..	..	..	..	..	..	..
Middletown	..	0	0	0	0	0	0	0	0	0	0	0
New Shoreham	..	0	0	..	..	0	0	0	..	..	..	..
Portsmouth	..	0	0	1	0	0	0	0	0	0	0	0
Tiverton	..	..	0	..	..	..	..	..	..	..	..	..
Newport	..	..	3	0	3	0	1	2	1	1	2	0
Burrillville	0	0	0	0	0	0	0	0	0	7	0	0
Cranston	2	0	2	..	9	..	0	0	1	3	3	3
Cumberland	1	0	0	0	2	0	0	0	0	0	..	0
East Providence	..	..	0	0	0	..	0	..	1	0	1	0
Foster	..	..	..	..	1	..	..	..	..	..	..	..
Glocester	0	0	0	0	0	0	0	0	0	0	0	0
Johnston	2	1	0	1	0	0	0	1	4	1	1	0
Lincoln	1	3	0	0	0	1	0	2	5	0	4	1
North Providence	..	0	0	0	0	0	0	0	..	0	0	0
North Smithfield	..	0	0	..	0	..	..	0	..	..	..	0
Pawtucket	..	..	0	0	1	0	0	2	1	2	3	1
Providence	53	23	40	17	8	11	10	13	28	25	18	12
Scituate	..	0	0	0	0	0	0	1	0	2	3	0
Smithfield	0	..	..	0	0	0	0	0	..	1	1	0
Woonsocket	0	0	1	0	0	0	2	12	2	6	10	8
Charlestown	..	..	..	..	0	..	..	..	..	..	..	..
Exeter	..	..	..	..	..	..	..	..	..	..	..	..
Hopkinton	..	..	..	..	..	..	0	0	1	0	1	3
Narragansett	..	..	..	0	..	0	0	1	0	1	1	1
North Kingstown	..	..	..	..	..	..	..	2	3	0	0	0
Richmond	..	0	1	1	0	0	0	0	0	0	0	0
South Kingstown	..	..	..	..	..	..	..	..	..	..	..	2
Westerly	..	0	0	0	0	0	0	1	5	7	3	0
Total	61	27	54	23	25	14	13	54	59	76	55	31

Contagious Diseases Reported in 1894.

DIPHTHERIA.

Cities and Towns.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Barrington	.	..	0	0	0	0	0	0	0	0	0	0
Bristol	0	0	0	0	0	0	0	0	0	0	0	0
Warren	1	0	0	0	0	0	0	0	0	0	0	0
Coventry	0	..	2	0	3	2	0	0	0	..	..	..
East Greenwich	..	0	0	0	0	0	0	0	0	0	0	1
West Greenwich	..	..	..	..	..	..	..	..	..	..	..	..
Warwick	0	..	0	0	0	0	0	0	..	0	0	0
Jamestown	..	..	..	0	0	0	0	0	0	0	0	..
Little Compton	..	..	..	..	..	..	..	..	..	..	..	..
Middletown	..	0	0	0	0	0	0	0	0	0	0	0
New Shoreham	..	0	0	..	..	0	1	0	..	..	..	..
Portsmouth	..	0	0	0	0	0	0	0	0	0	0	0
Tiverton	..	..	0	..	..	..	..	..	..	..	..	..
Newport	0	0	1	0	1	4	0	3	1	4	6	3
Burrillville	0	0	0	0	0	0	0	0	0	0	0	0
Cranston	5	0	2	4	5	..	0	1	0	4	0	0
Cumberland	1	0	1	0	0	0	1	0	0	0	..	0
East Providence	..	..	0	1	0	..	1	..	1	0	1	2
Foster	..	..	..	..	2	.	..	..	..	..	.	..
Glocester	0	0	0	0	0	0	0	0	0	0	0	0
Johnston	3	1	0	0	1	1	0	0	0	1	0	4
Lincoln	8	5	6	2	1	9	1	1	11	14	7	4
North Providence	0	0	0	0	0	0	0	0	..	0	0	1
North Smithfield	..	0	0	..	0	..	..	0	0	..	..	0
Pawtucket	4	..	2	3	2	0	1	1	3	4	7	20
Providence	9	9	8	8	18	13	2	3	7	6	11	20
Scituate	..	2	0	0	1	0	0	0	0	0	0	0
Smithfield	0	..	..	0	1	0	0	0	0	0	0	0
Woonsocket	3	0	3	0	0	1	0	0	0	0	0	2
Charlestown	..	..	..	..	1	..	..	..	..	..	..	..
Exeter	..	..	..	..	..	..	..	..	..	..	..	..
Hopkinton	..	..	..	..	..	..	0	0	0	0	0	0
Narragansett	..	..	..	0	..	0	0	0	0	0	0	0
North Kingstown	..	..	..	..	..	..	..	0	0	0	0	0
Richmond	0	0	6	4	5	2	0	1	0	0	0	0
South Kingstown	..	..	..	..	..	..	..	..	..	..	..	1
Westerly	1	0	0	0	0	0	0	0	0	0	0	0
Total	35	17	31	22	41	32	7	10	23	33	32	58

Contagious Diseases Reported in 1894.

SCARLET FEVER.

Cities and Towns.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Barrington	..	..	1	1	1	0	0	0	0	0	0	0
Bristol	7	2	0	0	0	0	0	0	0	0	0	0
Warren	3	0	0	2	2	2	0	2	0	0	0	0
Coventry	0	..	0	0	0	0	0	0	0	0	..	..
East Greenwich	..	0	2	0	0	1	0	0	0	1	0	1
West Greenwich	..	..	..	..	..	..	..	..	..	..	..	..
Warwick	6	9	3	7	2	0	0	1	..	0	0	1
Jamestown	..	..	..	0	0	0	0	0	0	0	0	..
Little Compton	..	..	..	..	..	..	..	..	..	..	..	..
Middletown	..	0	0	0	0	0	0	0	0	0	0	0
New Shoreham	..	0	0	..	..	0	0	0	..	..	..	..
Portsmouth	..	0	0	0	0	0	0	0	0	0	0	0
Tiverton	..	..	0	..	..	..	..	..	..	..	..	..
Newport	6	5	9	7	8	2	0	0	4	0	2	11
Burrillville	8	3	1	0	8	1	5	0	2	0	2	3
Cranston	2	2	0	4	9	..	0	2	4	1	5	4
Cumberland	6	4	5	2	2	3	2	0	0	1	..	0
East Providence	..	..	1	1	0	..	1	..	0	1	0	1
Foster	..	..	..	..	0	..	..	..	..	..	..	..
Glocester	6	1	0	0	0	0	0	0	0	0	0	0
Johnston	6	1	2	1	0	4	2	1	0	0	0	9
Lincoln	17	31	13	6	2	12	3	3	7	9	7	5
North Providence	..	0	0	0	0	0	0	0	..	1	1	0
North Smithfield	..	0	0	..	0	..	..	1	..	..	..	2
Pawtucket	9	..	12	13	0	3	1	2	5	22	9	3
Providence	48	30	34	23	35	25	19	12	30	30	62	74
Scituate	..	0	2	0	0	0	0	0	0	0	0	0
Smithfield	1	..	..	0	1	0	0	0	..	0	0	1
Woonsocket	8	6	8	3	0	0	0	0	6	8	3	6
Charlestown	..	..	..	..	0	..	..	..	..	..	..	..
Exeter	..	..	..	..	..	..	..	..	..	..	..	..
Hopkinton	..	..	..	..	..	..	0	9	0	0	0	0
Narragansett	..	..	..	0	..	0	0	0	0	0	0	0
North Kingstown	..	..	..	..	..	..	..	..	0	0	0	0
Richmond	..	0	0	0	1	0	0	0	0	0	8	0
South Kingstown	..	..	..	..	..	..	..	..	..	..	..	..
Westerly	0	1	0	0	0	0	0	0	0	3	4	1
Total	133	95	91	70	71	53	33	33	58	77	103	122

APPENDIX.

PUBLIC STATUTES.

CHAPTER 83.

OF THE STATE BOARD OF HEALTH.

SECTION 1. The governor with the advice and consent of the senate shall appoint six persons, two from the county of Providence and one from each of the other counties, who shall constitute the state board of health, one of whom shall be appointed in each year for the term of six years from the first day of July. Any appointment to fill a vacancy shall be for the remainder of the term. Of the persons so appointed, at least three shall be well educated physicians and members of some medical society incorporated by the state. The governor may remove any member for cause, at any time, upon the written request of two-thirds of the board.

SEC. 2. The board shall take cognizance of the interests of life and health among the citizens of the state; they shall make investigation into the causes of disease, and especially of epidemics and endemics among the people, the sources of mortality, and the effects of localities, employments, conditions and circumstances on the public health, and shall do all in their power to ascertain the causes and the best means for the prevention of diseases of every kind in the state. They shall publish and circulate, from time to time such information as they shall deem to be important and useful for diffusion among the people of the state, and shall investigate and give advice in relation to such subjects relating to the public health, as may be referred to them by the general assembly or by the governor when the general assembly is not in session.

SEC. 3. The state board of health shall also investigate the subject of diseases among cattle or other animals.

SEC. 4. The board shall meet in the city of Providence once in three months, and as much oftener as they may deem necessary. No member of the board,

except the secretary, shall receive any compensation for his services; but the actual personal expenses of any member, while engaged in the duties of the board, shall be paid by the state.

SEC. 5. The board shall elect a well qualified physician as their secretary, who shall be *ex-officio* a member of the board, the commissioner of public health and state registrar, but he shall not be permitted to vote on any question in which he is personally interested or be entitled to any additional compensation for mileage or expenses

SEC. 6. The secretary of the board shall make inquiry from time to time, of the clerks of town and local boards of health and practising physicians in relation to the prevalence of any disease, or knowledge of any known or generally believed source of disease or causes of general ill-health, and also in relation to the proceedings of the said boards of health; in respect of acts for the promotion and protection of the public health, and also in relation to diseases among domestic animals in their several towns; and the said clerks of town and local boards of health and said practising physicians shall give information, in reply to said inquiries, of such facts and circumstances as shall have come to their knowledge.

SEC. 7. The secretary shall perform and superintend the work prescribed for said board by law and such other duties as the board may require; he shall prepare and publish in every calendar month a general summary of all the deaths and causes of the same which had occurred in the state during the preceding month, the same to be made up from returns of deaths which shall be sent to him on or before the tenth day of the month following the date of such deaths, by the several town and city clerks and the city registrar of Providence city; he shall also prepare and publish for general distribution a monthly circular giving information and advice in regard to the preservation of health, suitable for each particular season, and giving also such information as he shall deem of advantage to the public, as to the prevalence and character of infectious diseases of domestic animals, and for such service he shall receive the sum of seventeen hundred dollars annually, or such proportion thereof as the said board may determine. He shall hold his office during the pleasure of the board and may be removed at any regular meeting by a majority vote of the members of said board.

SEC. 8. The governor shall provide a suitable office for the board in the city of Providence, and the actual expenses of the board and of the members thereof, when certified by the chairman and approved by the governor shall be paid from the state treasury.

SEC. 9. The board shall make a report in print to the general assembly, annually, of its proceedings during the year ending on the thirty-first day of December next preceding, with such suggestions in relation to the sanitary laws and interests of the state as they shall deem important.

INDEX.

* See Index to Forty-first Registration Report. Part II of this Report.

* See Index to Forty-first Registration Report.

* See Index to Forty-first Registration Report.

* See Index to Forty-first Registration Report.

* See Index to Forty-first Registration Report.

APPENDIX TO THE SEVENTEENTH ANNUAL REPORT OF THE STATE BOARD OF HEALTH OF RHODE ISLAND, FOR THE YEAR ENDING DEC. 31, 1894.

REPORT

OF THE

RESULTS OBTAINED

WITH

EXPERIMENTAL FILTERS

AT THE PETTACONSET PUMPING STATION OF THE PROVIDENCE WATER WORKS.

BY EDMUND B. WESTON,

MEMBER OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS.
MEMBER OF THE INSTITUTION OF CIVIL ENGINEERS OF GREAT BRITAIN.
ASSISTANT ENGINEER IN CHARGE OF WATER DEPARTMENT, PROVIDENCE, R. I.

PROVIDENCE, R. I.:
E. L. FREEMAN & SONS, STATE PRINTERS.
1896.

GENERAL CONTENTS.

REPORT OF THE RESULTS OBTAINED WITH EXPERIMENTAL FILTERS AT THE PETTACONSET PUMPING STATION OF THE PROVIDENCE WATER WORKS.

By EDMUND B. WESTON, C.E.,
Assistant Engineer in Charge of Water Department.

City Engineer's Office, Water Department.
Providence, R. I., March 12, 1894.

Mr. J. Herbert Shedd, City Engineer.

Dear Sir:—As directed by you, I commenced the experimental filtration work in the Cornish Engine House at Pettaconset Pumping Station in February, 1893.

The experimental filters, having been set up, were started about March 27, and the work was continued, with the exception of a brief interval in September, until January 30, 1894.

Two Experimental Filters, Nos. 1 and 2, built according to your design, and an Experimental Morison Mechanical Filter, were used during the course of the work. Another Experimental Mechanical Filter was also set up, at the expense of the owners of the same and run for several months, but as the results obtained with this filter were not satisfactory, it will not again be mentioned in this report.

Nos. 1 and 2 filters were run for about seven months as natural and mechanical filters, at rates of flow of about 2,000,000, 5,000,000 and 30,000,000 gallons per acre per 24 hours. The work with these filters was then discontinued.

The term Natural Filtration, is used in this report to designate the filtration of water through a bed of sand or quartz, when there has not been any foreign substance added to the Applied Water, and the term Mechanical Filtration, is used to designate the filtration of water through a bed of sand or quartz, when some foreign substance, such as Basic Sulphate of Alumina, has been added to the Applied Water.

A sketch representing Filters Nos. 1 and 2, is shown in Cut No. 1.

The arrangement of the interior of each of the Filters Nos. 1 and 2, is as follows:—

Upon the bottom of the filter a bed of cement about six (6) inches deep was laid. Several rows of bricks, set on edge, upon the cement, about six (6) inches apart supported a floor of bricks laid flatwise. The bricks of the floor were cut so as not to leave any openings of more than one-sixteenth ($\frac{1}{16}$) of an inch wide in the joints between the bricks or at the sides of the filter. The filter-bed consisted of three (3) inches of "pea gravel," which was placed upon the brick floor, a layer of coarse sand one (1) inch thick, which was laid upon the top of the "pea gravel," and upon this coarse sand the filtering medium proper was placed, which was composed of a layer of "fine sand," of uniform quality, one (1) foot and eight (8) inches deep. During the experiments several kinds of "fine sand" were used at different times in Filter No. 1 as the filtering medium and one kind during the entire time in Filter No. 2, the Effective Size and Uniformity Coefficient of which, are given in table No. 1.

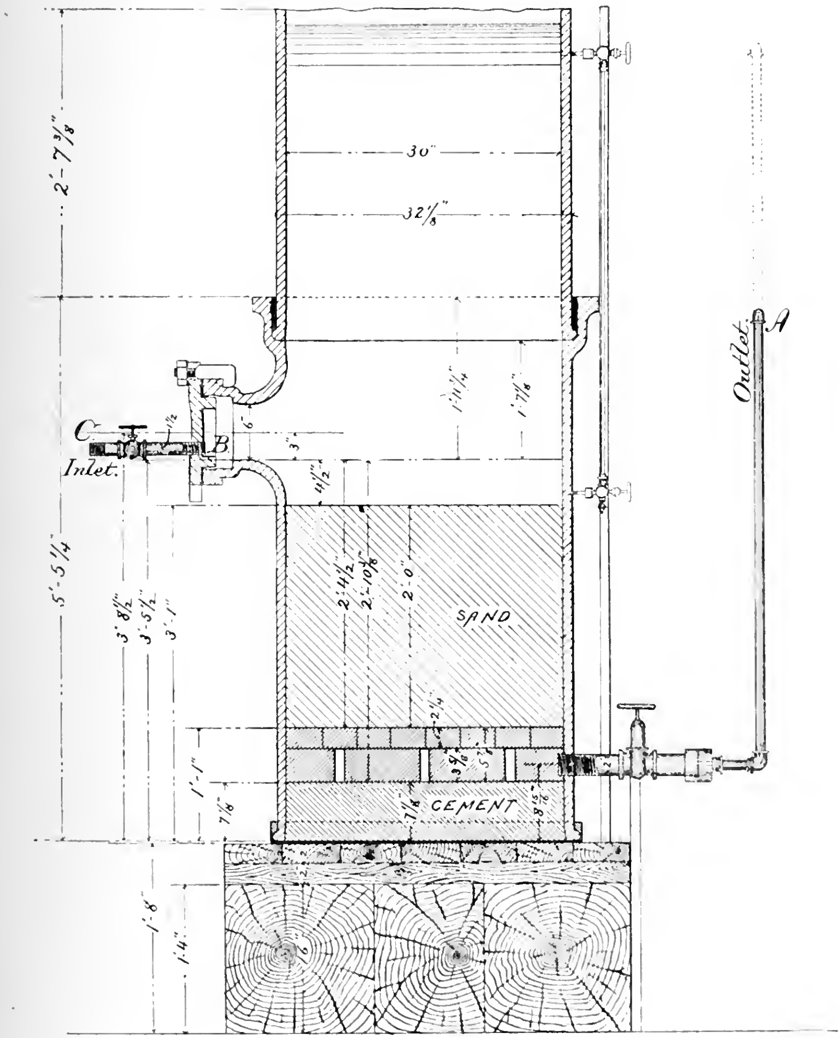
A representation of the Experimental Morison Mechanical Filter, which is described in detail in that portion of the report which describes the experiments made with this filter, is shown in Cut No. 2.

At the end of the runs of each of the Filters, Nos. 1 and 2, the filter-bed was either washed, or about one-half ($\frac{1}{2}$) of an inch of the top of the filtering medium scraped off.

When each filter-bed was washed a one-inch hose was connected to the discharge-pipe at *A*. This hose supplied the water used in washing, which was forced up through the brick floor and filter-bed under pressure, and overflowed through the six-inch branch at *B*, the cap, to which the inlet-pipe *C* is connected, having been removed.

The results that were obtained with Filters Nos. 1 and 2, and the chemicals that were used when they were run as mechanical filters are given in table No. 1. In the same table are given the results that were obtained with the Experimental Morison Mechanical Filter during the time that Filters Nos. 1 and 2 were in service. This table is intended for comparison only, as the bacterial colonies, from which the percentages contained in the table were determined, were only cultivated from 42 to 62 hours, and "Fifteen-

Cut No. 1.



Experimental Filters. Nos. 1 and 2

per-cent Gelatin" was used the greater part of the time as the cultivating medium instead of "Ten-per-cent Gelatin," consequently, it is quite likely that the percentages given in the table are slightly unreliable. The methods followed in regard to the bacteriological work are described in detail under the head of Bacteriological Work in that portion of the report which describes the experiments that were made with the Experimental Morison Mechanical Filter.

Table No. 1 practically describes itself, and it contains the only information which I shall hereafter mention in regard to Filters Nos. 1 and 2, owing to the very limited time at my disposal for the preparation of this report.

When Alumina or Alumina and "Free Flow," are mentioned in the table, in connection with the filters, it signifies that *Basic Sulphate of Alumina* and "Free Flow," were added to the Applied Water in the same manner as will be mentioned later on in detail in the description of the Experimental Morison Mechanical Filter. When Natural Filtration is mentioned in the table it signifies that the filters were run as natural filters.

The "Effective Size" and the "Uniformity Coefficient" mentioned in the table, were determined by the methods followed at the Experiment Station of the Massachusetts State Board of Health at Lawrence, Massachusetts.

The "Effective Size" of the filter material (diameter in millimeters). This size is such that 10 per cent. by weight of the material is of smaller grains, and 90 per cent. is of larger grains than the size given.

The "Uniformity Coefficient" is the ratio A to B when the values of A and B are such that 60 per cent. by weight of the material is finer than A and 10 per cent. finer than B.

Table No. 1.

Showing a comparison of the Results obtained from Filters Nos. 1 and 2 and the Morison Mechanical Filter from March 27 to October 5, 1893. The Samples of Filtered Water in the Table were all taken at the Same Hour as the Samples of Applied Water. The Bacteria were cultivated from 42 to 62 Hours.

Date.	Number of Bacteria in Applied Water.	Filter No. 1.			Filter No. 2.			Morison Mechanical Filter.		
		Number of Bacteria in Filtered Water.	Per cent. of Applied Water Bacteria Removed.	Gallons of Water Filtered per Acre, per 24 Hours.	Number of Bacteria in Filtered Water.	Per cent. of Applied Water Bacteria Removed.	Gallons of Water Filtered per Acre, per 24 Hours.	Number of Bacteria in Filtered Water.	Per cent. of Applied Water Bacteria Removed.	Gallons of Water Filtered per Acre, per 24 Hours.
		Effective Size of the Sand Grains of the Filtering Medium 0.81 mm. Uniformity coefficient 2.2. Started Filters Nos. 1 and 2. Natural Filtration.								
March 27, 1893..	....	2,795	...	3,110,000	196	....	2,100,000			
28, " ..	....	7,930	....	2,830,000	672	....	1,640,000	The average length of a run of the Morison Mechanical Filter (between washings), during the period covered by this table was about 18 hours. River Water was used for washing the Filter Bed.		
29, " ..	....	533	....	4,910,000	278	....	8,400,000			
30, " ..	....	650	...	4,730,000	3,610	....	860,000			
31, " ..	683	481	29.6	4,390,000	422	38.2	570,000			
April 1, " ..	858	334	61.1	4,390,000	500	41.7	5,700,000			
2, " ..	...	....	....	....	....	....	..			
3, " .	569	103	81.9	4,670,000	585	....	1,230,000			

TABLE NO. 1.—CONTINUED.

DATE.	Number of Bacteria in Applied Water.	FILTER No. 1.			FILTER No. 2.			MORISON MECHANICAL FILTER.		
		Number of Bacteria in Filtered Water.	Per cent. of Applied Water Bacteria Removed.	Gallons of Water Filtered per Acre, per 24 Hours.	Number of Bacteria in Filtered Water.	Per cent. of Applied Water Bacteria Removed.	Gallons of Water Filtered per Acre, per 24 Hours.	Number of Bacteria in Filtered Water.	Per cent. of Applied Water Bacteria Removed.	Gallons of Water Filtered per Acre, per 24 Hours.
April 4, 1893...	614	464	24.4	1,600,000	152	75.2	1,580,000	Effective Size of the Quartz Grains of the Filtering Medium 0.59 mm. Uniformity coefficient 1.5. Started Filter. Natural Filtration.		
5, " ...	789	222	71.9	1,540,000	419	46.9	1,220,000	329	58.3	....
6, " ...	808	123	84.8	1,450,000	52	93.6	1,830,000	169	79.1	128,000,000
7, " ...	587	2,145	....	1,360,000	56	90.5	2,080,000	....	...	...
8, " ...	315	234	25.7	1,280,000	97	69.2	1,160,000	13	95.9	96,000,000
9, " ...	....	....	...	....	....	....	....	....	...	....
10, " ...	2,030	222	89.1	1,930,000	440	78.3	1,810,000	2,395	....	118,000,000
11, " ...	....	....	....	....	...	....	...	....	...	....
12, " ...	983	113	88.5	1,370,000	79	92.0	1,250,000	744	24.3	127,000,000
13, " ...	....	....	....	....	....	....	....	....		....
									Alumina.	
14, " ...	923	64	93.1	1,700,000	74	92.0	1,560,000	520	43.7	61,500,000

April 15, 1893..	1,527	20	98.7	1,820,000	11	99.3	1,470,000	7	99.5	110,000,000
16, " ..	...	....	....	....	....	....	....	...	....	....
17, " ..	1,508	13	99.1	1,740,000	12	99.2	1,520,000	15	99.0	127,000,000
18, " ..	971	21	97.8	2,120,000	6	99.4	1,560,000	229	76.4	132,000,000
19, " ..	962	27	97.2	1,250,000	27	97.2	1,250,000	281	70.8	178,000,000
20, " ..	1,439	....	...	....	19	98.7	2,120,000	377	73.8	127,000,000
21, " ..	3,055	....	...	....	16	99.5	2,160,000	6	99.8	73,000,000
		Filter Bed Repacked with New Sand. Effective Size of Sand Grains 0.18 mm.								
22, " .	3,965	....	....	....	88	97.8	3,730,000	390	90.2	127,000,000
		Uniformity coefficient 2.1.								
23, " ..	...	.	....	...	....	....	....	...	....	....
		Started Filter. Natural Filtration.								
24, " ..	892	....	....	....	10	98.9	1,740,000	390	56.3	131,000,000
25, " .	966	170	82.4	4,920,000	10	99.0	1,740,000	119	87.7	115,000,000
								Alumina and "Free Flow."		
26, " ..	1,228	....	....	....	11	99.1	2,080,000	1	99.9	116,000,000
27, " ..	2,138	366	82.9	4,750,000	12	99.4	2,430,000	11	99.5	118,000,000
28, " ..	2,144	103	95.2	3,380,000	13	99.4	1,600,000	14	99.3	110,000,000
29, " ..	2,268	.	..	....	15	99.3	2,900,000	12	99.5	123,000,000

TABLE NO. 1.—CONTINUED.

DATE.	Number of Bacteria in Applied Water.	FILTER No. 1. Number of Bacteria in Filtered Water.	FILTER No. 1. Per cent. of Applied Water Bacteria Removed.	FILTER No. 1. Gallons of Water Filtered per Acre, per 24 Hours.	FILTER No. 2. Number of Bacteria in Filtered Water.	FILTER No. 2. Per cent. of Applied Water Bacteria Removed.	FILTER No. 2. Gallons of Water Filtered per Acre, per 24 Hours.	MORISON MECHANICAL FILTER. Number of Bacteria in Filtered Water.	MORISON MECHANICAL FILTER. Per cent. of Applied Water Bacteria Removed.	MORISON MECHANICAL FILTER. Gallons of Water Filtered per Acre, per 24 Hours.
		Washed Bed with Filtered Water. Started Filter. Natural Filtration.								
April 30, 1893...	....	....	....	....	....	....	....	....	....	....
May 1, " ...	1,907	106	94.4	2,020,000	42	97.8	1,470,000	29	98.5	116,000,000
2, " ...	1,417	125	91.2	1,820,000	10	99.3	1,200,000	5	99.6	121,000,000
3, " ...	1,988	24	98.8	1,740,000	12	99.4	1,660,000	4	99.8	119,000,000
4, " ...	2,310	20	99.1	1,620,000	32	98.6	2,360,000	3	99.9	93,000,000
5, " ...	7,831	...	....	....	77	99.0	1,520,000	18	99.8	106,000,000
6, " ..	1,634	....	.	....	....	....	....	5	99.7	113,000,000
7, " ...	...	....	....	....	....	....	....	....	....	....
8, " ...	707	..	....	....	....	....	....	5	99.3	106,000,000
9, " ...	767	....	...	....	....	....	....	1	99.9	103,000,000

May 10, 1893...	906	....	....	....	....	....	....	6	99.3	108,000,000
		Filter Bed Repacked with New Sand. Effective Size of Sand Grains 0.35 mm.								
11, " ...	....	....	....	....	...	.	..	....	....	....
		Uniformity coefficient 2.0.			Filter Bed Repacked with Same Sand.			Natural Filtration.		
12, " ...	1,569	...	....	....	....	...	...	308	80.4	128,000,000
		Started Filter.		Natural Filtration.	Started Filter.		Natural Filtration.			
13, " ...	819	2,684	...	2,360,000	3,767	...	1,190,000	453	44.7	171,000,000
14, " ...	....	....	....	...	....	..	....	....	....	....
								Alumina and "Free Flow."		
15, " ...	1,352	2,456	...	2,050,000	598	55.8	2,120,000	2	99.9	152,000,000
16, " ...	442	4,134	....	2,900,000	639	..	3,650,000	...	....	....
17, " ...	3,662	814	77.8	2,400,000	519	85.8	2,160,000	...	....	....
18, " ...	2,649	221	91.7	1,990,000	188	92.9	2,090,000	....	....	....
19, " ...	1,946	165	91.5	2,950,000	2,524	....	1,400,000	....	....	....
20, " ...	1,551	253	83.7	2,560,000	448	71.1	2,030,000	....	....	....
21, " ...	....	....	....	....	....	...	....	...	....	....
22, " ...	331	240	28.1	3,350,000	192	42.5	2,320,000	....	...	....
23, " ...	2,112	58	97.3	1,880,000	185	91.2	2,630,000	....	....	....
24, " ...	4,054	1,425	64.8	1,740,000	150	96.3	2,020,000	...	....	...

TABLE NO. 1.—CONTINUED.

DATE.	Number of Bacteria in Applied Water.	FILTER No. 1.			FILTER No. 2.			MORISON MECHANICAL FILTER.		
		Number of Bacteria in Filtered Water.	Per cent. of Applied Water Bacteria Removed.	Gallons of Water Filtered per Acre, per 24 Hours.	Number of Bacteria in Filtered Water.	Per cent. of Applied Water Bacteria Removed.	Gallons of Water Filtered per Acre, per 24 Hours.	Number of Bacteria in Filtered Water.	Per cent. of Applied Water Bacteria Removed.	Gallons of Water Filtered per Acre, per 24 Hours.
May 25, 1893...	3,090	55	98.2	1,420,000	130	95.8	1,520,000	...	....	....
26, " ...	2,918	24	99.2	2,500,000	46	98.4	2,240,000	....	....	....
27, " ...	5,135	26	99.5	1,610,000	31	99.4	1,720,000	....	....	....
28, " ...	....	...	....	....	...	....	....	....	...	....
29, " ...	1,858	77	95.9	3,520,000	137	92.6	3,520,000	...	....	....
30, " ...	3,119	55	98.2	2,060,000	34	98.9	2,090,000	....	....	....
31, " ...	9,945	195	98.0	3,220,000	372	96.3	2,000,000	...	....	....
									Alumina.	
June 1, " ...	6,825	381	94.4	1,800,000	323	95.3	2,370,000	3	100	134,000,000
2, " ...	8,202	62	99.2	1,870,000	94	98.9	3,030,000	2	100	131,000,000
3, " ...	18,817	133	99.3	3,020,000	159	99.2	2,843,000	104	99.4	132,000,000
4, " ...	....	....	....	....	...	...	....	...	....	....

June 5, 1893...	8,445	283	96.6	3,400,000	95	98.9	2,310,000	....	...	....
6, " ...	10,595	182	98.3	2,430,000	160	98.5	2,170,000	43	99.6	141,000,000
7, " ...	14,950	68	99.5	1,950,000	57	99.6	1,680,000	...	....	....
8, " ...	18,655	44	99.8	1,920,000	125	99.3	2,090,000	....	....	....
9, " ...	8,060	27	99.7	2,200,000	30	99.6	2,320,000	....	....	....
10, " ...	....	....	....	....	....	..	....	....	....	....
11, " ...	....	....	....	...	....	....	....	....	....	....
								Alumina and "Free Flow."		
12, " ...	5,460	8	99.9	1,950,000	14	99.7	2,180,000	0	100	123,000,000
13, " ...	12,187	282	97.7	1,940,000	16	99.9	2,980,000	74	99.4	148,000,000
14, " ...	54,400	....	....	....	4,420	91.9	4,550,000	3	100	125,000,000
		Started Filter.	Scraped Bed.	Natural Filtration.						
15, " ...	66,982	10,452	84.4	3,300,000	1,205	98.2	2,670,000	....	....	....
									Alumina.	
16, " ...	50,825	237	99.5	3,413,000	58	100	2,700,000	2,786	94.5	119,000,000
								Alumina and "Free Flow."		
17, " ...	43,095	591	98.6	3,460,000	146	99.7	2,780,000	1,355	96.9	121,500,000
18, " ...	....	....	....	....	....	....	....	....	....	....
19, " ...	15,015	744	95.0	1,700,000	28	99.8	2,310,000	75	99.5	117,000,000

TABLE NO. 1.—CONTINUED.

DATE.	Number of Bacteria in Applied Water.	FILTER No. 1. Number of Bacteria in Filtered Water.	FILTER No. 1. Per cent. of Applied Water Bacteria Removed.	FILTER No. 1. Gallons of Water Filtered per Acre, per 24 Hours.	FILTER No. 2. Number of Bacteria in Filtered Water.	FILTER No. 2. Per cent. of Applied Water Bacteria Removed.	FILTER No. 2. Gallons of Water Filtered per Acre, per 24 Hours.	MORISON MECHANICAL FILTER. Number of Bacteria in Filtered Water.	MORISON MECHANICAL FILTER. Per cent. of Applied Water Bacteria Removed.	MORISON MECHANICAL FILTER. Gallons of Water Filtered per Acre, per 24 Hours.
June 20, 1893...	16,700	180	98.9	3,540,000	54	99.7	2,230,000	63	99.6	136,000,000
21, " ...	40,787	134	99.7	2,230,000	73	99.8	2,070,000	..	....	....
22, " ...	12,707	19	99.9	2,330,000	36	99.7	1,790,000	...	...	....
23, " ...	41,855	11	100	2,400,000	12	100	1,920,000	...	..	....
24, " ...	20,522	13	99.9	2,200,000	16	99.9	2,030,000	....	...	....
25, " ...	....	....	....	...	....	....	....	....	...	....
26, " ...	1,488	29	98.1	2,850,000	26	98.3	3,210,000	....	....	....
27, " ...	2,762	9	99.7	2,610,000	105	96.2	2,570,000	181	93.4	131,000,000
28, " ...	5,460	11	99.8	2,430,000	190	96.5	2,320,000	8	99.9	123,000,000
29, " ...	3,900	10	99.7	2,060,000	206	94.7	1,750,000	1	100	120,000,000
30, " ...	2,957	2	99.9	2,020,000	17	99.4	1,870,000	7	99.8	132,000,000

July 1, 1893...	4,745	57	98.8	3,020,000	76	98.4	2,330,000	1	100	120,000,000
2, " ...	....	....	....	....	....	....	....	...	....	....
3, " ...	2,717	112	95.9	1,500,000	150	94.5	2,060,000	1	100	116,000,000
4, " ...	....	....	..	....	....	....	...	....	....	....
5, " ...	2,567	49	98.1	1,230,000	24	99.1	1,980,000	0	100	128,000,000
								Alumina.		
6, " ...	506	13	97.4	2,720,000	54	89.3	1,740,000	60	88.1	156,000,000
								Alumina and "Free Flow."		
7, " ...	1,319	35	97.3	2,160,000	33	97.5	2,010,000	0	100	136,000,000
8, " ...	944	18	98.1	1,300,000	9	99.0	2,000,000	1	99.9	135,000,000
9, " ...	...	....	....	....	....	....	...	....	....	....
10, " ...	315	18	94.3	1,490,000	30	90.5	4,820,000	....	....	....
11, " ..	655	4	99.4	1,910,000	15	97.7	2,270,000	1	99.8	125,000,000
								Natural Filtration.		
12, " ...	864	4	99.5	3,300,000	28	96.8	2,250,000	127	85.3	24,000,000
13, " ...	832	27	96.8	1,620,000	40	95.2	1,430,000	519	37.6	23,900,000
14, " ...	599	11	98.2	1,030,000	....	....	....	185	69.1	27,300,000
					Washed Bed with Filtered Water. Started Filter. Natural Filtration.					
15, " ...	1,043	10	99.0	1,490,000	985	5.6	30,200,000	656	37.1	30,200,000

TABLE No. 1.—CONTINUED.

DATE.	Number of Bacteria in Applied Water.	FILTER No. 1. Number of Bacteria in Filtered Water.	FILTER No. 1. Per cent. of Applied Water Bacteria Removed.	FILTER No. 1. Gallons of Water Filtered per Acre, per 24 Hours.	FILTER No. 2. Number of Bacteria in Filtered Water.	FILTER No. 2. Per cent. of Applied Water Bacteria Removed.	FILTER No. 2. Gallons of Water Filtered per Acre, per 24 Hours.	MORISON MECHANICAL FILTER. Number of Bacteria in Filtered Water.	MORISON MECHANICAL FILTER. Per cent. of Applied Water Bacteria Removed.	MORISON MECHANICAL FILTER. Gallons of Water Filtered per Acre, per 24 Hours.
July 16, 1893...	....	....	....	....	....	...	....	....	....	....
		Scraped Bed. Started Filter. Natural Filtration.								
17, " ...	565	153	72.9	29,300,000	40	92.9	30,500,000	27	95.2	21,300,000
								Alumina and "Free Flow."		
18, " ...	4,030	2,210	45.2	19,700,000	3	99.9	27,300,000	2	100	116,000,000
19, " ...	7,247	780	89.2	28,300,000	27	99.6	28,300,000	2	100	96,000,000
20, " ...	9,067	32	99.6	28,300,000	10	99.9	29,500,000	4	100	125,000,000
21, " ...	7,182	281	96.1	30,500,000	67	99.1	29,300,000	767	89.3	122,000,000
22, " ...	6,890	373	94.6	33,200,000	53	99.2	29,500,000	147	97.9	113,000,000
23, " ...	....	....	....	....	....	....	....	....	....	....
24, " ...	435	5	98.9	29,700,000	4	99.1	28,900,000	1	99.8	125,000,000
					Washed Bed with Filtered Water. Started Filter. Alumina and "Free Flow."					
25, " ...	4,160	....	....	....	49	98.8	27,300,000	1	100	134,000,000

		Scraped Bed Twice. Started Filter. Alumina.								
July 26, 1893..	17,485	2	100	20,700,000	633	96.4	29,400,000	1	100	122,000,000
		Scraped Bed. Started Filter. Alumina.								
27, " ..	15,340	565	96.3	30,600,000	186	98.8	26,500,000	4	100	123,000,000
		Scraped Bed. Started Filter. Alumina and "Free Flow."			Washed Bed with Filtered Water. Started Filter. Alumina and "Free Flow."					
28, " ..	8,542	35	99.6	17,800,000	....	...	....	9	99.9	30,500,000
		Scraped Bed. Started Filter. Alumina and "Free Flow."								
29, " ..	6,417	29	99.5	17,800,000	1,137	82.3	27,300,000	65	99.0	31,500,000
		Filter Bed Repacked with New Sand. Effective Size of Sand Grains 0.35 mm.			Alumina Discontinued. Natural Filtration.					
30, " ..	...	....	...	....	....	....	....	...	....	....
		Uniformity coefficient 2.0.								
31, " ..	747	....	...	..	60	92.0	26,500,000	19	97.5	24,000,000
		Started Filter. Natural Filtration.								
August 1, " ..	3,900	9,977	....	26,400,000	49	98.7	28,300,000	1	100	128,000,000
2, " ..	11,272	15,942	....	30,500,000	116	99.0	29,500,000	48	99.6	136,000,000
3, " ..	3,282	237	92.8	28,400,000	18	99.5	30,800,000	1	100	112,000,000
		Washed Bed with River Water. Started Filter. Alumina and "Free Flow."								
4, " ..	7,475	73	99.0	26,300,000	107	98.6	33,300,000	14	99.8	121,000,000
5, " .	5,557	78	98.6	29,000,000	162	97.1	29,400,000	4	99.9	132,000,000
		Washed Bed with River Water. Started Filter. Natural Filtration.								
6, " ..	....	....	....	....	....	....	....	...	....	...

TABLE NO. 1.—CONTINUED.

DATE.	Number of Bacteria in Applied Water.	FILTER No. 1. Number of Bacteria in Filtered Water.	FILTER No. 1. Per cent. of Applied Water Bacteria Removed.	FILTER No. 1. Gallons of Water Filtered per Acre, per 24 Hours.	FILTER No. 2. Number of Bacteria in Filtered Water.	FILTER No. 2. Per cent. of Applied Water Bacteria Removed.	FILTER No. 2. Gallons of Water Filtered per Acre, per 24 Hours.	MORISON MECHANICAL FILTER. Number of Bacteria in Filtered Water.	MORISON MECHANICAL FILTER. Per cent. of Applied Water Bacteria Removed.	MORISON MECHANICAL FILTER. Gallons of Water Filtered per Acre, per 24 Hours.
August 7, 1893..	461	60	87.0	24,000,000	174	62.3	25,500,000	4	99.1	125,000,000
8, " ..	1,397	107	92.3	31,900,000	232	83.4	29,400,000	4	99.7	125,000,000
9, " ..	7,085	85	98.8	31,900,000	43	99.4	28,300,000	0	100	116,000,000
		Washed Bed with River Water. Started Filter. Natural Filtration.								
10, " ..	16,900	1,950	88.5	30,500,000	134	99.2	28,300,000	0	100	121,000,000
11, " ..	3,315	207	93.8	28,900,000	182	94.5	29,500,000	5	99.8	125,000,000
12, " ..	4,582	167	96.4	26,500,000	224	95.1	34,500,000	28	99.4	125,000,000
13, " ..	...	....	....	....	....	....	...	....	....	....
14, " ..	395	331	16.2	33,300,000	68	82.8	28,300,000	4	99.0	128,000,000
		Filter Bed Repacked with New Sand. Effective Size of Sand Grains 0.31 mm.								
15, " ..	910	....	....	....	50	94.5	28,300,000	21	97.7	121,500,000
		Uniformity coefficient 2.2. Started Filter. Alumina and "Free Flow."								
16, " ..	356	137	61.5	31,900,000	18	94.9	28,300,000	5	98.6	121,500,000

August 17, 1893.	792	64	91.9	31,900,000	13	98.4	29,000,000	9	98.9	121,000,000
18, "	492	27	94.5	28,300,000	32	93.5	33,200,000	0	100	121,500,000
19, "	156	14	91.0	30,600,000	31	80.1	30,600,000	2	98.7	121,500,000
		Washed Bed with River Water. Started Filter. Alumina and "Free Flow."								
20, "	....	....	....	....	....	....	....	....	....	....
21, "	523	154	70.6	28,300,000	45	91.4	30,600,000	9	98.3	29,400,000
22, "	1,199	120	90.0	30,800,000	29	97.6	31,200,000	46	96.2	29,800,000
23, "	4,387	278	93.7	31,900,000	....	....	..	11	99.7	28,300,000
					Scraped Bed. Started Filter. Natural Filtration.					
24, "	....	64	....	28,900,000	....	....	...	1	....	28,000,000
		Washed Bed with River Water. Started Filter. Alumina and "Free Flow."								
25, "	....	....	....	....	253	...	13,800,000	4	....	28,350,000
26, "	852	59	93.1	28,300,000	81	90.5	30,700,000	114	86.6	29,000,000
27, "	..	....	...	..	...	...	....	...	....	....
		Washed Bed with River Water. Started Filter. Alumina and "Free Flow."								
28, "	457	109	76.1	27,500,000	56	87.7	29,500,000	...	....	...
					Scraped Bed. Started Filter. Natural Filtration.					
29, "	1,939	337	82.6	30,500,000	523	73.0	21,200,000	....	....	....

TABLE No. 1.—CONTINUED.

DATE.	Number of Bacteria in Applied Water.	FILTER No. 1.			FILTER No. 2.			MORISON MECHANICAL FILTER.		
		Number of Bacteria in Filtered Water.	Per cent. of Applied Water Bacteria Removed.	Gallons of Water Filtered per Acre, per 24 Hours.	Number of Bacteria in Filtered Water.	Per cent. of Applied Water Bacteria Removed.	Gallons of Water Filtered per Acre, per 24 Hours.	Number of Bacteria in Filtered Water.	Per cent. of Applied Water Bacteria Removed.	Gallons of Water Filtered per Acre, per 24 Hours.
					Scraped Bed. Started Filter. Natural Filtration.					
Aug. 30, 1893...	1,502	678	54.9	27,500,000	581	61.3	31,900,000	....	....	....
		Washed Bed with River Water. Started Filter. Alumina and "Free Flow."								
31, " ...	6,208	30	99.5	31,800,000	2,145	65.4	33,000,000	....	....	....
Sept. 1, " ...	495	65	86.9	29,500,000	80	83.8	31,800,000	....	....	....
		Washed Bed with River Water. Started Filter. Alumina and "Free Flow."								
2, " ...	1,007	566	43.8	30,600,000	54	94.6	34,500,000	....	....	....
3, " ...	....	....	....	....	...	....	...	....	...	...
		Washed Bed with River Water. Started Filter. Alumina and "Free Flow."			Washed Bed with River Water. Started Filter. Natural Filtration.					
4, " ...	576	79	86.3	27,500,000	63	89.1	30,500,000	....	....	....
5, " ...	788	40	94.9	29,500,000	78	90.1	34,500,000	2	99.7	154,000,000
		Washed Bed with River Water. Started Filter. Alumina and "Free Flow."								
6, " ...	1,192	81	93.2	30,500,000	79	93.4	31,800,000	4	99.7	125,000,000

Sept. 7, 1893...	683	444	35.0	31,800,000	14	98.0	29,800,000	1	99.9	122,000,000
8, " ...	1,126	299	73.4	30,500,000	92	91.8	31,800,000	7	99.4	125,000,000
		Washed Bed with River Water. Started Filter. Alumina and "Free Flow."								
9, " ...	4,325	200	95.4	25,500,000	68	98.4	30,500,000	2	100	122,000,000
10, " ...	....	....	....	....	....	....	....	....	...	....
		Washed Bed with River Water. Started Filter. Alumina and "Free Flow."								
11, " ...	470	25	94.7	33,000,000	9	98.1	30,500,000	3	99.4	128,000,000
12, " ...	741	10	98.7	33,000,000	20	97.3	31,800,000	....	..	....
		Washed Bed with River Water. Started Filter. Alumina and "Free Flow."								
13, " ...	2,467	325	86.8	31,800,000	16	99.4	33,000,000	...		....
		Washed Bed with River Water. Started Filter. Alumina and "Free Flow."			Washed Bed with River Water. Shut down Filter.					
14, " ...	16,825	2,047	87.8	30,000,000	....	....	....	....	....	....
									Shut down Filter.	
15, " ...	1,040	345	66.8	31,800,000	....	....	....	...		...
		Washed Bed with River Water. Shut down Filter.								
16, " ...	....	....	...	....	....	...	....	....	....	...
17, " ...	....	....	....	....	...	....	....	....	....	....
18, " ...	....	...	....		..	...	....	...	...	...

Table No. 1.—Continued.

DATE.	Number of Bacteria in Applied Water.	FILTER No. 1. Number of Bacteria in Filtered Water.	FILTER No. 1. Per cent. of Applied Water Bacteria Removed.	FILTER No. 1. Gallons of Water Filtered per Acre, per 24 Hours.	FILTER No. 2. Number of Bacteria in Filtered Water.	FILTER No. 2. Per cent. of Applied Water Bacteria Removed.	FILTER No. 2. Gallons of Water Filtered per Acre, per 24 Hours.	MORISON MECHANICAL FILTER. Number of Bacteria in Filtered Water.	MORISON MECHANICAL FILTER. Per cent. of Applied Water Bacteria Removed.	MORISON MECHANICAL FILTER. Gallons of Water Filtered per Acre, per 24 Hours.
Sept. 19, 1893...	....	..		..	.	.	...	...		...
20, " ...	...	....	....	.	.	....	....	..	....	....
21, " ...	..	...	...	..	..	...	....	..	..	....
22, " ...	....	...	....	....	.	..	....	..	...	....
23, " ...	....	...	...	...	....	....	....	....	...	....
24, " ...	....	....	....	...	..	...	...	...	..	....
25, " ...	....	....	....	....	...	....	....	....	....	....
26, " ...	....	....	....	....	....	....		...	....	....
		Washed Bed with River Water. Started Filter. Alumina and "Free Flow."			Washed Bed with River Water. Started Filter. Natural Filtration.			Started Filter. Alumina and "Free Flow."		
27, " ...	10,492	5,557	47.0	34,500,000	10,887	....	31,800,000	2	100	126,000,000
		Washed Bed with River Water. Started Filter. Alumina and "Free Flow."								
28, " ...	8,872	1,235	86.1	33,100,000	4,775	46.2	31,800,000	5	99.9	125,000,000

		Washed Bed with River Water. Started Filter. Alumina and "Free Flow."								
Sept. 29, " ...	56,587	18,330	67.6	31,800,000	18,005	68.2	31,800,000	17	100	128,000,000
30, " ...	64,960	17,135	73.6	31,800,000	1,217	98.1	31,800,000	6	100	125,000,000
Oct. 1, " ...	...	....	....	....	.	....	....	....	....	....
		Washed Bed with River Water. Started Filter. Alumina and "Free Flow."								
2, " ...	6,857	3,152	54.0	31,800,000	103	98.5	30,500,000	29	99.6	133,000,000
3, " ...	3,683	119	96.8	33,100,000	36	99.0	31,800,000	4	99.9	125,000,000
		Washed Bed with River Water. Started Filter. Alumina and "Free Flow."								
4, " ...	2,632	5,070	....	31,800,000	71	97.3	31,800,000	7	99.7	128,000,000
		Washed Bed with River Water. Started Filter. Alumina and "Free Flow."			Washed Bed with River Water. Started Filter. Natural Filtration.					
5, " ...	1,430	49	96.6	30,000,000	159	88.9	33,200,000	3	99.8	131,000,000
		Shut down Filter.			Shut down Filter.					

The number of bacteria given in the different columns of the table is the number found in one cubic centimeter of water.

TABLE No. 1.—CONTINUED.

Loss of Head in feet, due to the Flow of the Water through the Filter Bed and Discharge Pipe, and the Equivalent Height that the water rose in the filter during each run, after the filter first commenced to discharge at its full capacity, etc.

Date of commencement of run.	FILTER No. 1. Height of discharge-pipe in feet, above the filter-bed, at the commencement of the run.	Loss of Head in feet, due to the flow of the water through the filter-bed and discharge-pipe, at the commencement of each run.	The Equivalent Height in feet that the water rose in the filter during each run, after the filter commenced to discharge at its full capacity.	Gallons of Water Filtered per Acre, per 24 Hours, when the filter commenced to discharge at its full capacity, at the time that the loss of head was measured; also, the average flow of the filter during each run.*	Actual length of each run in days, hours, and minutes.
	Discharge-pipe stationary. The water gradually rose in the filter as the bed clogged up. Effective Size of the Sand Grains 0.81 mm. Uniformity coefficient 2.2. Natural Filtration.				
March 27, 1893	0.00	0.0156	0.0244	2,000,000 (2,276,000)	23*d.* 4*h.* 40*m.*
	Filter Bed Repacked with New Sand. Effective Size of the Sand Grains 0.18 mm. Uniformity coefficient 2.1. Natural Filtration.				
April 24, "	0.00	0.3646	1.5754	5,000,000 (5,764,000)	4*d.* 6*h.* 14*m.*
	Washed Bed with Filtered Water. Natural Filtration.				
April 29, "	0.00	0.1667	1.6633	2,000,000 (1,543,000)	5*d.* 5*h.* 10*m.*
	Water kept in filter at a constant height of about 4.0 feet above the bed. The discharge-pipe was gradually lowered as the bed clogged up. Filter Bed Repacked with New Sand. Effective Size of the Sand Grains 0.35 mm. Uniformity coefficient 2.0. Natural Filtration.				

May 13, 1893..........	4.00	0.06	6.04	2,000,000 (1,700,000)	31 *d.* 5 *h.* 58 *m.*
	Scraped Bed. Natural Filtration.				
June 15, "	4.00	0.02	6.08	2,000,000 (1,930,000)	30 *d.* 7 *h.* 46 *m.*
	Scraped Bed. Natural Filtration.				
July 17, "	4.00	0.72	4.84	30,000,000 (29,200,000)	6 *d.* 22 *h.* 33 *m.*
	Scraped Bed Twice. Alumina.				
July 26, "	4.00	2.30	2.15	30,000,000 (31,200,000)	0 *d.* 2 *h.* 22 *m.*
	Scraped Bed. Alumina.				
July 27, "	4.00	2.30	2.15	30,000,000 (36,600,000)	0 *d.* 5 *h.* 28 *m.*
	The discharge-pipe during the remainder of the experiments was kept stationary until the water rose in the filter to a height of about 4.5 feet above the filter-bed, owing to the bed having become gradually clogged up. The discharge-pipe was then gradually lowered.				
	Scraped Bed. Alumina and "Free Flow."				
July 28, "	0.20	1.61	2.99	30,000,000 (22,200,000)	0 *d.* 1 *h.* 59 *m.*
	Scraped Bed. Alumina and "Free Flow."				
July 29, "	0.20	1.61	2.99	30,000,000 (29,700,000)	0 *d.* 2 *h.* 2 *m.*

* Small figures in parentheses show the average flow.

TABLE No. 1.—CONTINUED.

FILTER No. 1.

Date of commencement of run.	Height of discharge-pipe in feet, above the filter-bed, at the commencement of the run.	Loss of Head in feet, due to the flow of the water through the filter-bed and discharge-pipe, at the commencement of each run.	The Equivalent Height in feet that the water rose in the filter during each run, after the filter commenced to discharge at its full capacity.	Gallons of Water Filtered per Acre, per 24 Hours, when the filter commenced to discharge at its full capacity, at the time that the loss of head was measured; also, the average flow of the filter during each run.*	Actual length of each run in days, hours, and minutes.
	Filter Bed Repacked with New Sand. Effective Size of the Sand Grains 0.35 mm. Uniformity coefficient 2.0. Natural Filtration.				
Aug. 1, 1893	0.20	0.25	4.20	30,000,000 (28,400,000)	2 *d.* 2 *h.* 12 *m.*
	Washed Bed with River Water. Alumina and "Free Flow."				
Aug. 3, "	0.20	0.70	3.77	30,000,000 (26,100,000)	0 *d.* 18 *h.* 27 *m.*
	Washed Bed with River Water. Natural Filtration.				
Aug. 5, "	0.20	0.36	5.92	30,000,000 (26,500,000)	4 *d.* 17 *h.* 29 *m.*
	Washed Bed with River Water. Natural Filtration.				
Aug. 10, "	0.20	0.37	5.93	30,000,000 (29,000,000)	4 *d.* 10 *h.* 47 *m.*
	Filter Bed Repacked with New Sand. Effective Size of the Sand Grains 0.81 mm. Uniformity coefficient 2.2. Alumina and "Free Flow."				
Aug. 16, "	0.20	0.39	5.91	30,000,000 (29,000,000)	5 *d.* 1 *h.* 8 *m.*

	Washed Bed with River Water. Alumina and "Free Flow."				
Aug. 21, 1893..........	0.20	0.37	5.93	30,000,000 (29,700,000)	3 *d.* 13 *h.* 35 *m.*
	Washed Bed with River Water. Alumina and "Free Flow."				
Aug. 25, "	0.20	0.48	4.78	30,000,000 (29,700,000)	1 *d.* 5 *h.* 41 *m.*
	Washed Bed with River Water. Alumina and "Free Flow."				
Aug. 28, "	0.50	0.45	3.65	30,000,000 (30,200,000)	2 *d.* 7 *h.* 31 *m.*
	Washed Bed with River Water. Alumina and "Free Flow."				
Aug. 31, "	0.50	0.65	3.45	30,000,000 (29,000,000)	1 *d.* 15 *h.* 29 *m.*
	Washed Bed with River Water. Alumina and "Free Flow."				
Sept. 2, "	0.50	0.56	5.54	30,000,000 (31,100,000)	1 *d.* 0 *h.* 12 *m.*
	Washed Bed with River Water. Alumina and "Free Flow."				
Sept. 4, "	0.50	0.49	3.59	30,000,000 (28,300,000)	1 *d.* 8 *h.* 32 *m.*
	Washed Bed with River Water. Alumina and "Free Flow."				
Sept. 6, "	0.50	0.53	3.54	30,000,000 (29,000,000)	2 *d.* 5 *h.* 12 *m.*

Small figures in parentheses show the average flow.

TABLE NO. 1.—CONTINUED.

Date of commencement of run.	FILTER No. 1. Height of discharge-pipe in feet, above the filter-bed, at the commencement of the run.	Loss of Head in feet, due to the flow of the water through the filter-bed and discharge-pipe, at the commencement of each run.	The Equivalent Height in feet that the water rose in the filter during each run, after the filter commenced to discharge at its full capacity.	Gallons of Water Filtered per Acre, per 24 Hours, when the filter commenced to discharge at its full capacity, at the time that the loss of head was measured; also, the average flow of the filter during each run.*	Actual length of each run in days, hours, and minutes.
	Washed Bed with River Water.		Alumina and "Free Flow."		
Sept. 8, 1893	0.50	0.50	3.59	30,000,000 (32,600,000)	2 *d.* 7 *h.* 47 *m.*
	Washed Bed with River Water.		Alumina and "Free Flow."		
Sept. 11, "	0.50	0.39	3.75	30,000,000 (30,300,000)	1 *d.* 3 *h.* 12 *m.*
	Washed Bed with River Water.		Alumina and "Free Flow."		
Sept. 12, "	0.50	0.33	3.76	30,000,000 (30,300,000)	1 *d.* 5 *h.* 22 *m.*
	Washed Bed with River Water.		Alumina and "Free Flow."		
Sept. 14, "	0.50	0.43	3.76	30,000,000 (31,100,000)	1 *d.* 6 *h.* 35 *m.*
	Washed Bed with River Water.		Alumina and "Free Flow."		
Sept. 27, "	2.00	0.38	0.48	30,000,000 (30,500,000)	1 *d.* 0 *h.* 0 *m.*

	Washed Bed with River Water.		Alumina and "Free Flow."		
Sept. 28, 1893..........	2.00	0.40	1.10	30,000,000 (28,900,000)	0 *d.* 21 *h.* 52 *m.*
	Washed Bed with River Water.		Alumina and "Free Flow."		
Sept. 29, "	2.00	0.56	0.96	30,000,000 (30,000,000)	0 *d.* 20 *h.* 41 *m.*
	Washed Bed with River Water.		Alumina and "Free Flow."		
Sept. 30, "	0.75	0.39	1.24	30,000,000 (27,600,000)	0 *d.* 20 *h.* 10 *m.*
	Washed Bed with River Water.		Alumina and "Free Flow."		
Oct. 2, "	0.50	0.55	2.31	30,000,000 (29,200,000)	1 *d.* 2 *h.* 50 *m.*
	Washed Bed with River Water.		Alumina and "Free Flow."		
Oct. 4, "	0.75	0.54	1.96	30,000,000 (30,500,000)	0 *d.* 23 *h.* 28 *m.*
	Washed Bed with River Water.		Alumina and "Free Flow."		
Oct. 5, "	0.75	0.45	2.21	30,000,000 (27,400,000)	1 *d.* 17 *h.* 20 *m.*

* Small figures in parentheses show the average flow.

TABLE No. 1.—CONTINUED.

FILTER No. 2.

Date of commencement of run.	Height of discharge-pipe in feet, above the filter-bed, at the commencement of the run.	Loss of Head in feet, due to the flow of the water through the filter-bed and discharge-pipe, at the commencement of each run.	The Equivalent Height in feet that the water rose in the filter during each run, after the filter commenced to discharge at its full capacity.	Gallons of Water Filtered per Acre, per 24 Hours, when the filter commenced to discharge at its full capacity, at the time that the loss of head was measured; also, the average flow of the filter during each run.*	Actual length of each run in days, hours, and minutes.
	Discharge-pipe stationary. The water gradually rose in the filter as the bed clogged up. Effective Size of the Sand Grains 0.81 mm. Uniformity coefficient 2.2. Natural Filtration.				
Mar. 27, 1893	0.00	0.0104	0.0196	2,000,000 (1,709,000)	39 *d.* 17 *h.* 55 *m.*
	Water kept in filter at a constant height of about 4.0 feet above the bed. The discharge-pipe was gradually lowered as the bed clogged up. Filter Bed Repacked with Same Sand. Effective Size of the Sand Grains 0.81 mm. Uniformity coefficient 2.2. Natural Filtration.				
May 13, "	4.00	0.02	5.98	2,000,000 (1,830,000)	61 *d.* 4 *h.* 26 *m.*
	Washed Bed with Filtered Water. Natural Filtration.				
July 15, "	4.00	0.25	4.54	30,000,000 (27,800,000)	8 *d.* 15 *h.* 27 *m.*
	The discharge-pipe during the remainder of the experiments was kept stationary until the water gradually rose in the filter to a height of about 4.5 feet above the filter-bed, owing to the bed having become gradually clogged up. The discharge-pipe was then gradually lowered.				

	Washed Bed with Filtered Water. Alumina and "Free Flow."				
July 25, 1893	0.20	0.50	4.10	30,000,000 (17,300,000)	3 d. 0 h. 30 m.
	Washed Bed with Filtered Water. Alumina and "Free Flow."				
July 29, "	0.20	1.22	4.97	30,000,000 (28,500,000)	0 d. 7 h. 14 m.
	Alumina discontinued. Natural Filtration.				23 d. 21 h. 12 m.
	Scraped Bed. Natural Filtration.				
Aug. 23, "	0.50	0.39	3.96	30,000,000 (29,400,000)	5 d. 21 h. 4 m.
	Scraped Bed. Natural Filtration.				
Aug. 29, "	0.50	4.20	Did not reach its full capacity.	22,300,000	0 d. 2 h. 0 m.
	Scraped Bed. Natural Filtration.				
Aug. 30, "	0.50	1.02	3.07	30,000,000 (30,300,000)	4 d. 7 h. 33 m.
	Washed Bed with River Water. Natural Filtration.				
Sept. 4, "	0.50	0.27	3.86	30,000,000 (28,300,000)	9 d. 8 h. 39 m.
	Washed Bed with River Water. Natural Filtration.				
Sept. 27, "	2.00	0.32	1.94	30,000,000 (29,200,000)	7 d. 6 h. 6 m.
	Washed Bed with River Water. Natural Filtration.				
Oct. 5, "	0.75	0.33	3.34	30,000,000 (30,100,000)	10 d. 2 h. 57 m.

* Small figures in parentheses show the average flow.

TABLE NO. 1.—CONTINUED.

MORISON MECHANICAL FILTER.

Date of commencement of run.	Height of discharge-pipe in feet, above the filter-bed, at the commencement of the run.	Loss of Head in feet, due to the flow of the water through the filter-bed and discharge-pipe, at the commencement of each run.	The Equivalent Height in feet that the water rose in the filter during each run, after the filter commenced to discharge at its full capacity.	Gallons of Water Filtered per Acre, per 24 Hours, when the filter commenced to discharge at its full capacity, at the time that the loss of head was measured; also, the average flow of the filter during each run.*	Actual length of each run in days, hours, and minutes.
	Discharge-pipe stationary. The water gradually rose in the filter as the bed clogged up. Effective Size of the Quartz Grains 0.59 mm. Uniformity coefficient 1.5. Natural Filtration.				
April 5, 1893..........	3.75	2.00	3.42	128,000,000 (119,000,000)	4 d. 7 h. 20 m.
	Washed Bed with River Water. Natural Filtration after "Free Flow."				
May 11, "	3.75	2.44	3.56	128,000,000 (100,000,000)	3 d. 23 h. 35 m.
	Washed Bed with River Water. Natural Filtration.				
July 12, "	0.75	0.10	1.40	30,000,000 (18,500,000)	5 d. 20 h. 58 m.
	Washed Bed with River Water. Alumina and "Free Flow."				
Aug. 21, "	3.75	0.45	5.60	30,000,000 (29,000,000)	2 d. 7 h. 21 m.
	Washed Bed with River Water. Alumina and "Free Flow."				
From April 17 to July 8, and from Aug. 8 to Sept. 11, 1893.	† 3.75	2.44	3.56	128,000,000 (115,000,000)	Average. 0 d. 16 h. 38 m.
	Washed Bed with River Water. Alumina and "Free Flow."				
From July 10 to Aug. 7, 1893.	0.75	2.44	3.56	128,000,000 (121,000,000)	Average. 0 d. 17 h. 38 m.

† Includes runs when "Free Flow" was not used.

* Small figures in parentheses show the average flow.

Table No. 1.—continued.

Average Color of the Water during each run, of Filters Nos. 1 and 2.

(Did not begin to observe color until May 20, 1893.)

Filter No. 1. Date run commenced.	Filter No. 1. Average color of Applied Water.	Filter No. 1. Average color of Filtered Water.	Filter No. 1. Per cent. of color removed.	Filter No. 2. Date run commenced.	Filter No. 2. Average color of Applied Water.	Filter No. 2. Average color of Filtered Water.	Filter No. 2. Per cent. of color removed.
May 13, 1893....	....	6.0	....	May 13, 1893.....	....	6.6	....
June 15, "	....	7.1	....	July 15, "	....	8.8	....
July 17, "	....	9.0	....	" 25, "	+10.0	6.1	39.
" 26, "	+10.0	1.0	90.	" 29, "	+10.0	9.8	2.
" 27, "	+10.0	7.7	23.	Aug. 23, "	4.5	3.0	33.
" 28, "	+10.0	1.5	85.	" 29, "	4.5	3.0	33.
" 29, "	+10.0	1.3	87.	" 30, "	4.5	3.0	33.
Aug. 1, "	+10.0	10.0	00.	Sept. 4, "	4.6	2.8	39.
" 3, "	+10.0	2.5	75.	" 27, "	4.3	3.3	20.
" 4, "	+10.0	8.9	11.	Oct. 4, "	4.6	2.9	37.
" 5, "	+10.0	10.0	00.				
" 10, "	+10.0	10.0	00.				
" 16, "	+10.0	8.9	11.				
" 21, "	5.0	2.8	44.				
" 25, "	4.0	1.1	73.				
" 28, "	4.7	1.6	66.				
" 31, "	5.0	1.0	80.				
Sept. 2, "	5.0	0.7	86.				
" 4, "	5.0	0.7	86.				

TABLE NO. 1.—CONTINUED.

FILTER No. 1.

Date run commenced.	Average color of Applied Water.	Average color of Filtered Water.	Per cent. of color removed.
Sept. 6, 1893....	4.7	2.4	49.
" 8, "	5.0	1.2	76.
" 11, "	4.0	0.9	78.
" 12, "	4.0	0.8	80.
" 14, "	4.0	0.7	83.
" 27, "	4.0	1.7	58.
" 28, "	4.0	1.9	52.
" 29, "	5.0	2.2	56.
" 30, "	4.0	1.5	63.
Oct. 2, "	4.3	1.7	60.
" 4, "	5.0	1.6	68.
" 5, "	4.0	1.8	55.

The average percentage of color removed from the water by filtration through the Morison Mechanical Filter, when Basic Sulphate of Alumina was used, is: From June 28, to Oct. 26, 1893, 81.0, and from Oct. 28, 1893, to Jan. 30, 1894, 78.0.

TABLE No. 1.—CONCLUDED.

Quantity of Basic Sulphate of Alumina Used.

During the periods covered by the table when Basic Sulphate of Alumina was used, the average rate added to the Applied Water per gallon was :—

IN THE MORISON MECHANICAL FILTER.

On April 29, $\frac{31}{100}$ of a grain, including "Free Flow"; on June 16, $\frac{26}{100}$ of a grain, not including "Free Flow"; and on June 27, $\frac{35}{100}$ of a grain, including "Free Flow." From April 14 to April 25 inclusive, from June 1 to June 3 inclusive, and on June 6 and July 6, $\frac{50}{100}$ of a grain, not including "Free Flow," and for all other periods during the experiments with this filter $\frac{60}{100}$ of a grain, including "Free Flow."

IN FILTER No. 1.

From July 26 to July 27 inclusive, $\frac{50}{100}$ of a grain, not including "Free Flow." On October 4, $1\frac{11}{100}$ grains, including "Free Flow," and for all other periods during the experiments with this filter $\frac{60}{100}$ of a grain, including "Free Flow."

IN FILTER No. 2.

From July 25 to July 29 inclusive, $\frac{60}{100}$ of a grain, including "Free Flow."

Description of the Experiments that were made with the Experimental Morison Mechanical Filter.

There are a number of cases throughout this report, in the text and tables, where the Experimental Morison Mechanical Filter is called the Morison Mechanical Filter, the latter, however, is simply an abbreviation of the former.

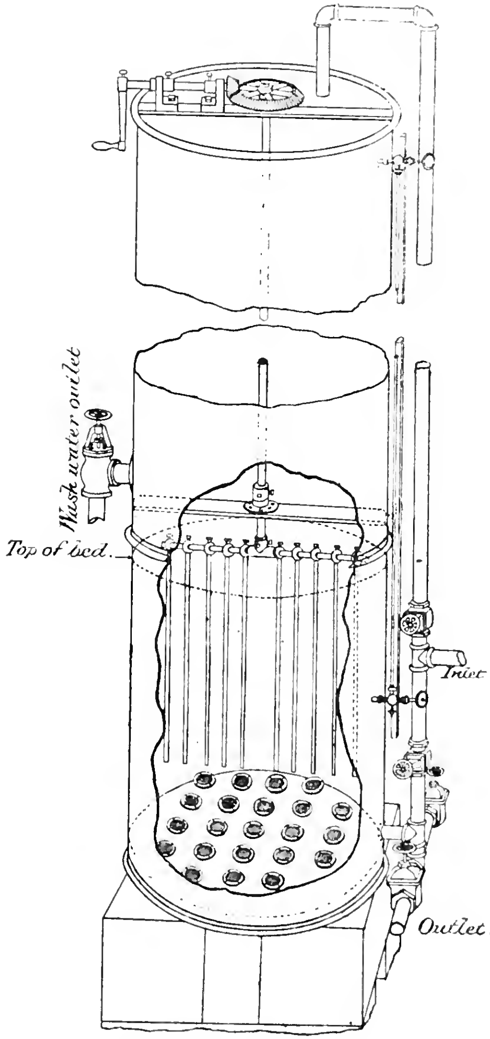
A sketch representing the Experimental Morison Mechanical Filter that was used during the filtration experiments is shown in Cut No. 2.

Upon the screens shown at the bottom of the filter, the filtering medium, or filter-bed, of crushed quartz is located, the total depth being two (2) feet and ten (10) inches. The Effective Size of the grains of quartz which compose the upper two (2) feet is 0.59 millimeters, and the Uniformity Coefficient 1.5. The lower ten (10) inches of quartz is of a much coarser quality. The screens allow the water to pass through them during the different operations of working the filter, downward while filtering, and upward during the process of washing the filter-bed. They prevent the quartz or any foreign substances from entering the collecting pipes, or passing off with the filtered water.

The manner in which the filter was operated during the experiments is as follows: At the end of a run, or immediately before starting the filter, the filter-bed was thoroughly washed by forcing up through the screens and filter-bed a reverse flow of water under pressure, the mechanical rake or agitator shown in the cut being operated at the same time, which added materially to the efficient cleansing of the filter-bed. The water was forced up through the bed and the agitator kept in motion until the water flowing from the overflow drain-pipe was as clear as it was before it was used for washing the filter-bed. The necessary valves were then operated and the water and Sulphate of Alumina turned on to the filter.

The rates of the filtration of water, mentioned in this report, all represent an average rate per Acre per 24 hours, unless otherwise specified. The standard rate of filtration decided upon at the commencement of the experiments was 128,000,000 gallons per Acre per 24 hours. When the term Sulphate of Alumina is used it is intended as an abbreviation of Basic Sulphate of Alumina.

Cut No. 2.



Morison Experimental Filter.

Height 14 feet, Diameter 30 inches

In making the experiments with this filter, the following details were carefully investigated, as well as many other points relative to the efficient working of the filter, viz :—

First.—The chemicals best adapted for the purification of the Pawtuxet River Water.

Second.—The best method of applying the chemicals, and the quantity to add to the Applied Water for each gallon of water filtered.

Third.—If any portion of the chemicals that were added to the Applied Water were present in the Filtered Water.

Fourth.—The rate in gallons per Acre per 24 hours, which could be efficiently filtered.

Fifth.—The bacteriological and chemical purification of the water.

Sixth.—The percentage which the color of the water would be reduced by filtration.

Seventh.—The washing of the filter-bed.

Eighth.—The time which would be required for washing the filter-bed.

Ninth.—The quantity of water which would be required to wash the filter-bed.

Tenth.—The quantity of water which it would be necessary to run to waste after washing the filter-bed.

Eleventh.—The length of time which the filter would run after starting, before it would be necessary to shut down and wash the filter-bed on account of the water gradually rising to its prescribed limit in the filter, owing to the filter-bed becoming gradually clogged up.

Twelfth.—The effective stability of the quartz and supplementary precipitate bed, viz :—whether it could be depended upon to do its work thoroughly during the whole of the time that the filter was in operation or whether at times it would be liable to crack or break, or have its efficiency reduced in any manner.

Thirteenth.—The loss of head due to the water flowing through the filter-bed and screens.

During the preliminary experiments, the chemicals used were Basic Sulphate of Alumina, Chloride of Alumina, Carbonate of Soda, Bicarbonate of Soda, Caustic Soda, and Chloride of Iron. The soda salts were used in connection with Sulphate of Alumina. It was found, however, that Basic Sulphate of Alumina added to the Applied Water produced the best results. Basic Sulphate of Alumina, therefore, is the only chemical that has been used since the preliminary experiments.

The theory of Mechanical Filtration, when Basic Sulphate of Alumina has been added to the Applied Water, may be described as follows: The Alumina causes an artificial precipitation. A portion of the Alumina is decomposed, forming sulphates of other bases and a flocculent precipitate of Aluminic Hydrate. A portion of it also combines directly with the organic matter present in the water, coagulating the same and thus helping to increase the precipitation. A sufficient quantity of the precipitate having been deposited upon the top of the sand or quartz-bed of the filter and plugged into the interstices of the upper layer of sand or quartz grains, the filter is ready for service.

At the commencement of the experiments with the Morison Mechanical Filter, it was discovered, that satisfactory results could not be obtained by simply dropping the Sulphate of Alumina into the Applied Water at the rate of one-half ($\frac{1}{2}$) grain per gallon, as it would take from 1 to 3 hours after the filter was started for a sufficient quantity of the precipitate to form in order to do good work. After experimenting in different ways, it was found, that if a "Free Flow" of about a pint of coagulant containing about nine hundred and eleven (911) grains of Sulphate of Alumina, for an average rate of filtration of about 128,000,000 gallons per Acre per 24 hours, was allowed to run into the filter, immediately after the water was let on, in a space of time of not more than six (6) minutes, a quantity of coagulant corresponding to one-half ($\frac{1}{2}$) grain of Sulphate of Alumina per gallon of Filtered Water being dropped in at the same time from a different receptacle than that containing the "Free Flow," a sufficient amount of precipitate would be formed to do good work in one-half hour or less after the water commenced to flow from the filter.

At the commencement of a run of the filter, the Applied Water, was, at first, gradually let into the filter, it being regulated at the same time. After the normal quantity commenced to flow into the filter a constant flow was maintained, and the depth of water

in the filter gradually increased proportionately during the run as the supplementary precipitate bed was formed and the filter-bed became plugged with precipitate. The rise of water practically accommodated itself to the circumstances, and caused a constant flow of water through the filter, which I considered extremely essential in order to obtain good results.

Two experiments, that were made about five months after the filter was first started for the purpose of ascertaining the loss of head due to the addition of the "Free Flow" and Sulphate of Alumina as above described, demonstrated, that the addition of the "Free Flow" and Sulphate of Alumina caused a loss of head of about twenty-eight hundredths (0.28) of a foot (for a rate of 128,000,000 gallons), in addition to the loss of head which was caused by the passage of the water through the quartz-bed. These two experiments each covered a space of time of about thirty-five (35) minutes, from the time that the water was first let on to the filter until a rate of 128,000,000 gallons per Acre per 24 hours was reached.

A number of experiments that have been made during the progress of the work, by running the filter as a "natural filter," have shown, approximately, that the average efficiency of the filter, for removing water bacteria, was increased about thirty-eight (38) per cent., while filtering at an average rate of about 30,000,000 and 127,000,000 gallons, by adding the "Free Flow" and Sulphate of Alumina at the rate of one-half ($\frac{1}{2}$) grain per gallon.

A description of the method that was followed in adding the Basic Sulphate of Alumina to the Applied Water is as follows: The coagulant used (including the "Free Flow"), was made by dissolving one (1) part of the Sulphate of Alumina (by weight), in seven (7) parts of water (by weight). The cisterns that were used in adding the coagulant to the Applied Water were located upon the top of the filter. The cistern that supplied the "Free Flow," was simply a small tin can with a faucet, which could be regulated as desired. The cistern that fed the Sulphate of Alumina, at the rate of one-half ($\frac{1}{2}$) grain or more per gallon, was an earthern jar which had a small faucet connected near its bottom. To the outlet of this faucet was connected a small glass dropper. The faucet was so regulated, by the aid of a carefully graduated measuring glass, that the coagulant would drop from the "dropper" into the filter at an average rate of about sixty (60) drops per minute (for a rate of one-half ($\frac{1}{2}$) grain of Sulphate

of Alumina per gallon), for a rate of filtration of 128,000,000 gallons per Acre per 24 hours. These drops were counted every half hour, day and night, while the filter was running, and the faucet regulated when necessary. The Sulphate of Alumina coagulant and "Free Flow" were turned on immediately after the water commenced to flow into the filter, at which time there was always a depth of about nine (9) inches or more of water upon the quartz-bed. The drops of coagulant fell into the interior of the filter upon the surface of the water and were thoroughly mixed with the water by the agitation produced by the water falling from the outlet of the supply-pipe.

One of the most serious problems that it was necessary to solve when the experiments were commenced, was to ascertain if the Basic Sulphate of Alumina, that was added to the Applied Water, was entirely decomposed before the water was discharged from the filter.

I was informed by two eminent chemists, that it would be a very difficult matter, to positively ascertain the quantity of Alumina, if there was any, in the Applied or the Filtered Water, although the Aluminum Compounds could be determined without much difficulty. It was decided, therefore, to make use, principally, of the "Logwood and Acetic Acid test," for alum, of Mrs. E. H. Richards of the Massachusetts Institute of Technology. "Chemical Analyses" were also made, by Professors Appleton and Drown, as will be seen by the tables and appendix.

It was found, during preliminary experiments with the Logwood and Acetic Acid test, by adding different quantities of Sulphate of Alumina to Distilled Water, and by exercising great care and using fresh Logwood decoction carefully prepared, that one (1) part of Sulphate of Alumina in 1,000,000 parts of water could be detected, which is equivalent to about one (1) part of Alumina (Al_2O_3) in 6,000,000 parts of water or $\frac{1}{100}$ of a grain to a gallon of water.

A sample of the Sulphate of Alumina used had the following composition :—

	Per cent.	One-half ($\frac{1}{2}$) grain contains in grains.
Insoluble residue........................	0.52	0.0026
Alumina (Al_2O_3)........................	15.78	0.0789
Sulphur trioxide (SO_3)........................	36.79	0.1840
Water (by difference)........................	46.91	0.2345
	100.00	0.5000

The Logwood and Acetic Acid test was applied to the Filtered Water for a number of days, and in nearly every instance the test indicated the presence of Alumina in solution. This of course was a very serious matter, as the presence in the Filtered Water of Alumina in solution as the test seemed to indicate, was a strong argument against mechanical filtration. I consulted with Mrs. Richards in regard to the application of the Logwood and Acetic Acid test, as well as with several other chemists in regard to the matter, but they were not able to throw any new light upon the subject. Finally Dr. S. C. Hooker, a chemist of Philadelphia, suggested to Dr. Chapin, Superintendent of Health, who was also investigating the subject, that the alum tint, produced in the Filtered Water by Mrs. Richards' test, might be due to a small quantity of finely suspended hydrate, which could be proved by a careful filtration of the Filtered Water through filter-paper and then applying the Logwood and Acetic Acid test.

A short time after Dr. Hooker suggested this method of treating the Filtered Water, it was applied in my presence by Professor C. A. Doremus in his New York laboratory.

Two samples of equal quantity, of Filtered Water from the Morison Mechanical Filter, were taken from the flask containing the same ("Free Flow" and one-half ($\frac{1}{2}$) grain of Sulphate of Alumina per gallon having been added to the water before filtration). One sample was filtered through two thicknesses of fine German filter-paper, the Logwood and Acetic Acid test was then applied to each sample, and the alum tint was produced in the sample that had not been filtered through the paper, while the sample that had been filtered through the paper was entirely free from it. After my return to Providence, I made quite a number of tests in the manner above described with Filtered Water and with River Water to which Basic Sulphate of Alumina had been added at the rate of one-half ($\frac{1}{2}$), three-fourths ($\frac{3}{4}$), and one (1) grain per gallon, and obtained the same results, namely:—no traces of the alum tint were detected after the application of the Logwood and Acetic Acid test in any of the samples of water that had been filtered through paper. Several tests were also made with Distilled Water freshly distilled from River Water, to which Sulphate of Alumina had been added at the rate of one-half ($\frac{1}{2}$) grain per gallon, and the alum tint was visible both before and after filtration, though of a slightly darker shade in the former. The alum tint was not produced in the Distilled Water owing to

the absence of the constituents from the Distilled Water necessary to decompose the Alumina and form a hydrate, consequently it passed through the filter-paper, in the Distilled Water, in a soluble form.

While we were in doubt as to the complete decomposition of the applied Alumina (before Dr. Hooker's suggestion, that the alum tint produced by the Logwood and Acetic Acid test in the Filtered Water was due to a finely suspended hydrate instead of Alumina in solution, had been found to be correct), several experiments were made with two settling tanks (having a combined area about ten times the area of the filter), in order to ascertain, if possible, if a more complete chemical action would take place, if a longer length of time was allowed to elapse before the Applied Water (after the Sulphate of Alumina had been added), reached the filter-bed. During these experiments the Applied Water was first run into a tank (having an area of about sixteen (16) square feet, and a depth of two and twenty-five hundreths (2.25) feet). The Sulphate of Alumina coagulant was dropped into this tank instead of being dropped directly into the filter, and the "Free Flow" put into the filter in the usual way. The water flowed from this tank, through an orifice, located about four (4) inches above its bottom, into a larger tank, situated directly under it (having an area of about thirty-three (33) square feet, and a depth of two and twenty-five hundreths (2.25) feet), and from this latter tank, through a pipe, one and one-quarter (1¼) inches in diameter, connected about three (3) inches above its bottom, into the filter. It took the Applied Water, which flowed continually through both tanks, about twenty-two (22) minutes to pass through the first tank and about fifty-three (53) minutes to pass through the second tank. The results obtained, from the experiments that were made with the settling tanks, were not quite as satisfactory, from a bacteriological standpoint, as the results obtained by dropping both the Sulphate of Alumina coagulant and "Free Flow" into the filter, in the usual way, as has already been described, and there was not any diminution in the indications of Alumina in solution in the Filtered Water, so far as could be discovered by applying the Logwood and Acetic Acid test.

When the filter was started the water commenced to flow from the outlet-pipe, generally, about five (5) minutes after it was turned on to the filter. A sample of the Filtered Water was always collected one (1) minute after it commenced to flow, and

five samples, one every five (5) minutes for one-half hour, and then hourly during the day and several times during the night. No alum tint was ever visible in the one (1) minute and six (6) minute samples, when the Logwood and Acetic Acid test was applied, either before or after filtration through paper. In all of the other samples, the alum tint was visible before filtration through paper, and in the eleven (11) and sixteen (16) minute samples it was visible after filtration through paper and occasionally in the twenty-one (21) minute sample, but it never was detected in any of the samples taken later than twenty-one (21) minutes after the water commenced to flow from the filter. The eleven (11), sixteen (16), twenty-one (21) and twenty-six (26) minute samples had generally, before filtration through paper, a darker tint, which grew less as the time increased, than the hourly and night samples. The same may be said of the eleven (11) and sixteen (16) minute samples after filtration through paper, and of the twenty-one (21) minute sample when the alum tint was visible. Great care was taken to have the Logwood decoction prepared properly. It was also necessary to guard against filter-paper that contained traces of aluminum salts. The paper was always tested by applying the Logwood and Acetic Acid test to two samples of freshly Distilled Water, one of which had been filtered through the paper, and one of which had not. The best results are obtained with the Logwood and Acetic Acid test, when it is applied expeditiously, and in making the test, in order to aid in detecting the alum tint, it should be applied to a sample of Distilled Water at the same time that it is applied to the samples of Filtered Water.

Bacteriological Work.

As I was informed when the filtration work was first commenced, that the bacteriological cultivations and counts of the samples of water would be made under the direction of the Superintendent of Health, I did not assume any direct responsibility in regard to the bacteriological work until early in September. At this time I commenced to personally investigate the subject, and was asked by the Superintendent of Health to make any suggestions that I deemed advisable and to give such directions as I thought proper in regard to this work. After making myself familiar with the methods that were generally followed in this country and abroad, and consulting with Professor H. C. Ernst of

the Harvard University Medical School, who had made some test counts for us upon two occasions, I came to the conclusion that the bacteria had not been cultivated long enough to reach their highest growths, and that the "Fifteen-per-cent Gelatin" that had been used, nearly the whole of the time, should be discontinued and "Ten-per-cent Gelatin" used, which is the nutrient media generally made use of in the cultivation of water bacteria.

The majority of the counts from March 27 to October 6, 1893, had been made after a cultivation of from 42 to 62 hours. Subsequent investigations have proved that these counts were made too soon, and that more bacterial colonies would have been visible when the counts were made, if a longer period had been allowed for cultivation and "Ten-per-cent Gelatin" used. I am, therefore, of the opinion that the bacteriological counts that were made from March 27 to October 6, 1893, are not strictly reliable, and should only be used for comparing the efficiency of the different filters. The application, however, of a slight correction, derived by comparing the counts of from 42 to 62 hours with results that have been obtained since October 6, 1893, tends to show, when Basic Sulphate of Alumina and "Free Flow" were used, that an average of about ninety-nine (99) per cent. of the Applied Water bacteria was removed by the Morison Mechanical Filter, from March 27 to October 6, 1893. This average percentage, if it had not been corrected, would have been slightly more than ninety-nine per cent.

Owing to the reasons given above, the only bacteriological work which I shall mention, and describe hereafter, unless otherwise specified, will be the work that was done later than October 6, 1893, or that which was done previous to that time by Professor H. C. Ernst.

The method used in cultivating the bacterial colonies was the familiar method of gelatin-plate culture devised by Koch.

The bacterial colonies were grown at the laboratory temperature.

The bacterial colonies visible in each dish were first counted after a cultivation of about 42 hours, and subsequently about every 24 hours until an increase in their number could no longer be detected. It was then assumed that their end growths had been reached. The entire length of time necessary for cultivation ranged from 67 to 236 hours.

A great deal of trouble was caused by the bacterial colonies liquefying before end growths were reached (from October 17,

1893, to January 30, 1894, all of 51 days' samples were lost on this account). and it was deemed advisable on December 12, 1893, to discontinue using one (1) cubic centimeter from each sample of Filtered Water which had previously been used in each dish and to use four dishes for each sample with one-fourth ($\frac{1}{4}$) of one (1) c.c. in each dish.

This method, though being an improvement upon the use of one (1) c.c., was not entirely satisfactory, and on December 26, 1893, another change was made, namely :—the equal division, from each sample, of one-half ($\frac{1}{2}$) of one (1) c.c. among five dishes. This latter method was followed until the completion of the work, and very little inconvenience was experienced from liquefying colonies during this time. A check was kept upon it by frequently cultivating one (1) c.c. in one dish, from the same sample that one-half ($\frac{1}{2}$) of one (1) c.c. divided by five (5) was taken from, and the average result obtained from all the one (1) c.c. cultures, which could be kept 137 hours or more without liquefying, was almost exactly the same as the average of the one-half ($\frac{1}{2}$) of one (1) c.c. divided by five (5) cultures that were taken from the same samples.

Four dishes, each containing $\frac{1}{100}$ of one (1) c.c. of Applied Water, were used in making the cultures of the Applied Water, with the exceptions which will be mentioned hereafter.

The methods of cultivating the samples of Filtered Water, when Bacillus Prodigiosus was being added to the Applied Water, were the same as those that have previously been described ; but only in a few instances was it possible to ascertain, on account of liquefaction, if end growths had been reached. But as it is generally customary to count cultures of these bacilli after from 48 to 96 hours growth, and as table No. 19, giving the results that were obtained when they were being applied, shows that the samples of Filtered Water were cultivated from 41 to 208 hours before they liquefied, and the samples of Applied Water from 40 to 190 hours, there is not any doubt, I think, but what the percentages given in this table are sufficiently reliable.

A pure culture of Bacillus Prodigiosus was obtained, by inoculation and growth for about four days, in the following solutions, namely : On November 22, 23 and 25, 1893, one (1) liter of Bouillon ; on the 28 and 29, four (4) cubic centimeters of the above Bouillon in one (1) liter of tap water ; on December 2, 5 and 6, a solution of one-tenth ($\frac{1}{10}$) per cent. Peptone, and two-tenths ($\frac{2}{10}$)

per cent. Glucose in tap water; on the 12, 13 and 14, four (4) cubic centimeters of the above Peptone and Glucose solution in one (1) liter of Sterile Water; on the 15 and 16, five (5) cubic centimeters of the Peptone and Glucose solution in one (1) liter of Sterile Water; on the 18 and 19, four (4) cubic centimeters from one (1) liter of Bouillon and "Ten-per-cent Gelatin" in which the culture was made, in one (1) liter of Sterile Water; on the 20, 21 and 22, the full Peptone and Glucose solution; from December 3, 1893, to January 3, 1894, inclusive, one-tenth ($\frac{1}{10}$) of the Peptone and Glucose solution in one (1) liter of tap water; and from January 4 to 8, one-twentieth ($\frac{1}{20}$) of the Peptone and Glucose solution in one (1) liter of tap water.

The Bacillus Prodigiosus Solution was uniformly applied by being dropped into the filter from an earthen jar located upon the top of the filter.

Cruikshank's Bacillus, that was prepared and used in a manner similar to the Bacillus Prodigiosus, was added to the Applied Water on July 27 and August 17, and on October 11 and 12, 1893, at the rate of more than one million (1,000,000) per cubic centimeter. Three (3) colonies of this bacillus were found, after a cultivation of five days, in the sample of Filtered Water that was collected on July 27. None were discovered in the samples of Filtered Water that were collected on the other days mentioned.

The samples of Applied Water containing the Bacillus Prodigiosus were drawn from a stop-cock connected to the filter about seven (7) inches above the filter-bed. Samples of the Applied Solution were also taken during each run, and if the samples from the top of the filter liquefied in cultivation, the number of Bacillus Prodigiosus in the Applied Water were estimated from the number in the Applied Solution.

The Bacillus Prodigiosus Applied Water was generally cultivated in four dishes, two, each containing $\frac{1}{1000}$ c.c. and two, each containing $\frac{1}{10000}$ c.c. The Applied Solution was cultivated in two dishes, each generally containing $\frac{1}{1000000}$ c.c.

The proportions of $\frac{1}{100}$ c.c. of the Applied Water and the $\frac{1}{1000}$ c.c. and $\frac{1}{10000}$ c.c. of the Bacillus Prodigiosus Applied Water and the $\frac{1}{1000000}$ c.c. of the Applied Solution, were obtained, for cultivation, by diluting with Sterile Water of known volume. The proportions of one-fourth ($\frac{1}{4}$) of one (1) c.c. and one-tenth ($\frac{1}{10}$) of one (1) c.c. of the Filtered Water were obtained by direct measurement without dilution.

The samples of Applied Water (not containing Bacillus Prodigiosus), were collected from a tap in the pipe which supplied the filter with water. All samples of Filtered Water were collected at the outlet of the discharge-pipe of the filter.

The gelatin used in the bacteriological work was tested for alkalinity up to about the first of November with litmus paper and after that time by the "phènol-phthalèin test."

The following table, computed from results obtained in our laboratory, shows the Ratios of the growths of bacterial colonies in "Ten-per-cent Gelatin," over what they were in "Fifteen-per-cent Gelatin," etc.

NUMBER OF HOURS OF CULTIVATION, ETC.

Number of Samples.	41 ± Hours.	Number of Samples.	67 ± Hours.	Number of Samples.	89 ± Hours.	Number of Samples.	113 ± Hours.	Number of Samples.	137 ± Hours.	Date. December. 1893.
3	1.08	3	1.36	3	1.58	2	1.09	1	0.94	14
10	1.06	10	1.14	10	1.01	9	0.85	7	0.79	15
4	3.00	4	1.16	4	1.17	3	1.28	..	....	16
1	1.53	1	*1.31	....	....	....	....	..	...	18
16	1.23	8	1.18	...	....	...	....	...	...	19
16	1.33	8	1.41	....	....	....		...	...	20
18	1.89	18	1.69	12	1.62	....	....	....	..	21
Average ratios.	1.60	...	1.32	....	1.35	....	1.07	....	0.87	...

* Not included in averages.

The above table indicates that nearly the same results can be obtained with "Fifteen-per-cent Gelatin" as can be obtained with

"Ten-per-cent Gelatin," if the bacteria are grown more than 113 hours.

The Bacteriological Work, in the laboratory was done from March 27, to December 10, 1893, by Dr. G. T. Swarts, Medical Inspector, with the exception of several short periods of time, when it was done by Dr. C. V. Chapin, Superintendent of Health. From December 11, 1893, to January 31, 1894, the work was done by Dr. M. T. Richardson, a graduate of the Harvard University Medical School, who was recommended by Professor H. C. Ernst. The remainder of the time, from February 1, to February 12, the counts were made by myself.

Since October 1, I have had consultations in regard to the Bacteriological Work, with Professor H. C. Ernst of the Harvard University Medical School, Professor E. K. Dunham of the Carnegie Laboratory of New York, and Professor T. M. Prudden of Columbia College. These gentlemen, all of whom are expert bacteriologists, have signified their approval of the methods that have been followed in regard to the Bacteriological Work, since October 6, 1893.

Description of Tables.

All of the tables from No. 2 to No. 21 inclusive refer to the Experimental Morison Mechanical Filter.

The columns in the Bacteriological tables from No. 2 to No. 8 inclusive headed "Grains of Sulphate of Alumina used per Gallon," include "Free Flow." The rate of Alumina (not including "Free Flow"), that was added constantly to the Applied Water, was gauged very carefully and it was intended to apply it at a specific rate per gallon, as the case might require, of one-half ($\frac{1}{2}$) grain or three-fourths ($\frac{3}{4}$) of a grain (or more or less). This could not always be done in actual practice, however, as the outlet of the "dropper" was so small that it would sometimes clog up in spite of constant watchfulness and testing. The computed average rate, including "Free Flow" and a constant addition of Alumina at the rate of one-half ($\frac{1}{2}$) grain per gallon, would be fifty-nine one-hundreths ($\frac{59}{100}$) of a grain for an average length of run of 16 hours and 43 minutes and an average rate of filtration of 128,000,000 gallons per Acre per 24 hours, and under the same conditions the computed average rate, including "Free Flow" and a constant addition of three-fourths ($\frac{3}{4}$) of a grain of Alumina per gallon,

would be eighty-four one-hundredths ($\frac{84}{100}$) of a grain. The quantity of "Free Flow" used was always the same, therefore an increase or decrease in the length of the run would of course change the computed average rate of Alumina used during the entire run, and a slight deviation one way or the other in the quantity of water filtered would also change the average rate of Alumina used. More than the usual care was exercised in all gaugings of both Alumina and Water for at least one-half hour before the samples of Filtered Water were collected.

Tables from No. 2 to No. 19 inclusive give the Bacteriological Results that have been obtained and the percentages of the Bacteria in the Applied Water that were removed by filtration, computed from the same. Only one sample of Applied Water was generally collected each day, the hour of collection in the great majority of cases being from 12 M. to 1 P. M. The samples of Filtered Water were collected as will be seen from the tables, from One (1) to Ten (10) times daily.

Table No. 2 gives the End Growths or positive results that were obtained from Samples of Filtered Water that were collected at the Same Hour as the Applied Water, once during each run, generally from 12 M. to 1 P. M., One Hour or More after water commenced to flow from the filter.

Table No. 3 covers the same ground as table No. 2, with the exception that it is computed from counts that were made after a cultivation of about Ninety Hours. This table was made for comparison with table No. 2, as it is generally customary to make the counts of water bacteria after they have been cultivated about four days.

Table No. 4 gives the End Growths or positive results that were obtained from Samples of Filtered Water that were collected from One (1) to Nine (9) times each day, One Hour or More after water commenced to flow from the filter. The percentages were all based upon results derived from the single sample of Applied Water that was generally collected from 12 M. to 1 P. M. daily.

Table No. 5 gives the End Growths and all of the Growths of Eighty Five Hours or More, that did not reach their End Growths, that were obtained from Samples of Filtered Water that were col-

lected from One (1) to Nine (9) times each day, One Hour or More after water commenced to flow from the filter. The percentages were all based upon results derived from the single sample of Applied Water that was generally collected from 12 M. to 1 P. M. daily.

Table No. 6 gives the End Growths or positive results that were obtained from Samples of Filtered Water that were collected Thirty Minutes or Less after water commenced to flow from the filter. The percentages were all based upon results derived from the single sample of Applied Water that was generally collected from 12 M. to 1 P. M. daily. River Water was used in washing the filter, with the exception of on November 15, 17, 18, 20, 23 and 24, when Filtered Water was used.

Table No. 7 covers the same ground as table No. 6, with the exception that it was computed from counts that were made after a cultivation of about Ninety Hours. This table was made for comparison with table No. 6, for the same purpose as is mentioned in the description of table No. 3.

Table No. 8 gives the End Growths and all of the Growths of Eighty Five Hours or More, that did not reach their End Growths, that were obtained from Samples of Filtered Water that were collected Thirty Minutes or Less after water commenced to flow from the filter. The percentages were all based upon results derived from the single sample of Applied Water that was generally collected from 12 M. to 1 P. M. daily.

In tables Nos. 2, 3, 4, 5, 6, 7 and 8 during the time that Bacillus Prodigiosus was used, the number of bacteria in the columns headed "In Filtered Water," include the Bacillus Prodigiosus, when there were any, found in the Filtered Water. (See table No. 19). If they had not been included, the average per cents, of the "Applied Bacteria Removed," would be slightly larger and a few of the individual per cents considerably larger. This does not affect, however, any of the final results or conclusions which will be mentioned hereafter in this report, for reasons which will be subsequently explained.

The average percentages given in the tables from No. 2 to No.

8 inclusive, which are not inclosed in parentheses, and which were considered as a basis for all comparisons and summaries, were obtained by averaging the individual per cents given in the tables. The average percentages obtained by using the total number of bacteria found in the Applied and Filtered Water are also given in the tables, inclosed in parentheses, in order to show the difference between this method of computation, which is sometimes followed for obtaining average bacterial percentages, and the method just previously mentioned. The average percentages obtained by using total numbers, as can be seen by inspecting the tables range from 0.0 to 3.1 more than the averages obtained by using the individual per cents of each sample.

Tables Nos. 9 and 10 were computed from tables Nos. 2, 3, 4, 5, 6, 7 and 8, and give Summaries of the Average Percentages of Applied Water Bacteria that were Removed by the filter. The averages obtained by "totals" are also given in parentheses in these two summaries. They were obtained in the same manner as described above for tables from No. 2 to No. 8 inclusive.

Tables from No. 11 to No. 18 inclusive, were computed from tables Nos. 2, 3, 4, 5, 6, 7 and 8.

Tables Nos. 11 and 15 give the number of times that Percentages of More than Two Per cent., of the Applied Water Bacteria, Appeared in the Filtered Water. Also the Percentages that the number of times are of the Total Number of Results obtained.

Tables Nos. 12, 14, 16 and 18 give the number of times that Percentages of the Applied Water Bacteria Removed, which were used in working up the Average Percentages given in tables Nos. 9 and 10, were One Per cent. and More Less than the average Per cent. Removed. Also the Percentages that the number of times are of the Total Number of Results obtained.

Tables Nos. 13 and 17 give the number of times that Percentages of the Applied Water Bacteria Removed, which were used in working up the Average Percentages given in tables Nos. 9 and 10, were More than Two Per cent. Less than the Average Per cent. Removed. Also the Percentages that the number of times are of the Total Number of Results obtained.

Table No. 19 gives the Percentage of Applied Bacillus Prodigiosus that was Removed from the water by filtration. Also the number of these bacilli that were found in the Applied and Filtered Water and the length of time that they were Grown. The "Last Growth obtained," mentioned in the table, was the last growth that could be obtained before the bacterial colonies liquefied. The Average Percentages given in the table were obtained in the same manner as the averages given in tables from No. 2 to No. 8 inclusive. The quantity of Alumina used per gallon of Applied Water is given in the latter part of the table.

Table No. 20 gives the Chemical Analyses of Applied and Filtered Water that were made during the experiments with the Experimental Morison Mechanical Filter, by Professor J. H. Appleton.

Table No. 21 gives the Color of samples of Applied and Filtered Water that were collected during the experiments with the Experimental Morison Mechanical Filter, and the Percentage of Color that was Removed from the Applied Water by filtration.

Table No. 22. As the elaborate and very valuable experiments relative to the Natural Filtration of water, that have been made at Lawrence, Massachusetts, under the direction of the State Board of Health of Massachusetts, during the past few years, are recognized, I think, by the engineering profession the world over, as being the most complete exposition of the subject that has ever been made, table No. 22 has been compiled from the Report of the State Board of Health of Massachusetts for the year 1892, in order to make, in a few instances, a general comparison of some of the results that have been obtained at Providence with the Morison Mechanical Filter with some of the results that have been obtained by Natural Filtration with Experimental Filters at Lawrence.

The Massachusetts Report states, relative to some of the data that has been used in computing the table, namely: "It has" "been found, however, that the true degree of bacterial purifica-" "tion is somewhat obscured by the presence in the effluent of" "bacteria which have not come down through the filter directly" "from the Applied Water. Some of them appear to have their"

"origin in the outlet-pipes and underdrains where they continue" "to live upon the very slight amount of food present. This is" "especially noticeable during the warm summer months when" "a few of the more hardy species grow upon the organic matter" "stored at the surface."

The principal object of table No. 22 is to show the number of times that Percentages of One Per cent. and More, of the Applied Water Bacteria, Appeared in the Filtered Water of the different filters, the number of times that the Percentages of Applied Water Bacteria Removed were One Per cent. and More Less than the Average Per cent Removed, and the Percentages that the number of times are of the Total Number of Results obtained; and to show the Percentages that the number of times that More than Two Per cent. of the Applied Water Bacteria Appeared in the Filtered Water, are of the Total Number of Results obtained, and the Percentages that the number of times, that the Percentages of the Applied Water Bacteria Removed that were More than Two Per cent. Less than the Average Per cent. Removed, are of the Total Number of Results obtained. The above results were calculated from data given in the tables of the Massachusetts Report, above mentioned, on pages from 491 to 524.

The average rates of filtration given in the Seventh column, of the First part of table No. 22 were obtained by averaging the daily rates of filtration, from June to November inclusive, of the days when both samples of Applied and Filtered Water were collected (given in the Massachusetts Report on pages from 491 to 524), with the exception of the rates of those days when the number of bacteria in the "Effluent" exceeded the number in the Applied Water, and are therefore somewhat approximate.

The Average Percentages of Bacteria Removed, not inclosed in parentheses, given in the Ninth column of the First part of table No. 22, were obtained by averaging the individual per cents worked out from daily samples, taken from June to November inclusive, given in the tables of the Massachusetts Report on pages from 491 to 524, with the exception of those cases in which the number of bacteria in the "Effluent" exceeded the number in the Applied Water, (viz: 2 in 33A; 3 in 34A; 3 in 36A; 2 in 37; 1 in 38; 1 in 39; 2 in 40). The Massachusetts Report states, in a note under the tables of December bacterial results, that "Channels were formed in the sides of the filters," and on page 477 that "This took place to a greater or less extent in the case"

"of all the small filters, and the results obtained in December" "have not for this reason been included in the discussion." The number of results used in working out these percentages is given in the Second, Third and Fourth parts of table No. 22. The percentages were computed in the manner above described in order to compare them with the results obtained with the Morison Mechanical Filter, as, has previously been explained, the percentages given in the tables relating to the Morison Mechanical Filter, that have been considered in all comparisons and summaries, were obtained by using individual per cents which were worked out from all the results obtained while the filter was in its normal condition, there not being any results rejected on account of excessive numbers of bacteria being found in the Filtered Water.

The figures inclosed in parentheses, given in the Ninth column of the First part of table No. 22, were obtained by averaging the individual per cents of daily samples in the same manner as the percentages which are not inclosed in parentheses, with the exception that samples were not considered in which the number of bacteria in the "Effluent" exceeded 500. These percentages were computed by this method in order to show the difference that the rejection of the last mentioned samples would make in the average percentages.

A foot-note at the bottom of the tables in the Massachusetts Report states that "Numbers above 500 do not appear in the" "averages (see page 530)." The information on page 530 of the Massachusetts Report, referred to in this note, relating to the subject, is as follows: "The statistics in the tables (pp. 490–525)" "show that all of the effluents at times contained very large" "numbers of bacteria during July and August. In some cases" "they equalled and even exceeded the number applied. This" "was least noticeable in case of the intermittent filters Nos. 35 A" "and 41. Some error in the process of determination was at first" "suggested as the reason for this. Detailed study of the condi-" "tions under which the examinations were made, however, to-" "gether with the results of more numerous examinations, indi-" "cated that this was not so. It then appeared that there must" "be present in the filters at times conditions which favored the" "growth of certain kinds of bacteria."

The figures given in the Tenth column of the First part of table No. 22, not inclosed in parentheses, are percentages of removal

worked out by using the total number of bacteria found in the "Effluent" and Applied Water of each filter during the entire period above specified, instead of from individual results. In other respects the same method was followed as was used in working out the percentages given in the Ninth column. These percentages were computed in order to compare them with the corresponding percentages given in the Ninth column.

The average percentages given in the Tenth column inclosed in parentheses, were worked out in the same manner as those not inclosed in parentheses in the Tenth column, with the exception that samples were not considered in which the number of bacteria in the "Effluent" exceeded 500. These percentages, which were also computed in order to compare them with the corresponding percentages given in the Ninth column, were worked out in a manner similar to the method followed in working out the bacterial percentages given in the Massachusetts Report.

The Average Percentages given in table No. 22, considered in making all comparisons with the results obtained with the Morison Mechanical Filter, unless otherwise specified, were computed by averaging the individual per cents of daily samples including samples in which the bacteria in the "Effluent" exceeded 500, with the exception of those samples in which the number in the "Effluent" exceeded the number in the Applied Water. As can be seen by the table the average per cents obtained by this method range from 0.5 to 2.8 less than the averages computed by using, as mentioned above, the total number of bacteria found in the "Effluent" and Applied Water.

Table No. 2.

Filtration Experiments.—Morison Mechanical Filter.

End Growths, of Water Bacteria in the Samples of Applied and Filtered Water that were taken at the Same Hour (which was One Hour or More after water commenced to flow from the filter).

Date.	Gallons of Water Filtered per Acre, per 24 Hours.	Bacteria per Cubic Centimeter.		Per cent. of the Applied Bacteria Removed.	Average Percentage of the Applied Bacteria Removed.	Grains of Sulphate of Alumina used per Gallon.
		In Applied Water.	In Filtered Water.			
1893.						
July * 20,	125,000,000	2,000	11	99.5	......	0.75
" 21,	122,000,000	9,477	16	99.8	......	0.90
Oct. 3,	125,000,000	905	6	99.3	......	0.60
" 4,	128,000,000	610	2	99.7	......	0.58
" 5,	131,000,000	4,002	25	99.4	99.5 (99.6)	0.55
Oct. 17,	125,000,000	6,175+	43	99.3	......	† 0.57
" 27,	122,000,000	10,700	44	99.6	.....	0.61
" 30,	128,000,000	1,700	12	99.3	......	0.56
" 31,	131,000,000	500	16	96.8	......	0.59
Nov. 1,	132,000,000	21,200	28	99.9	......	0.61
" 2,	123,000,000	7,600	34	99.6	......	0.81
" 3,	122,000,000	12,500	66	99.5	......	0.84
" 4,	132,000,000	4,100	101	97.5	......	‡ 1.20
" 9,	125,000,000	3,300	35	98.9	......	0.85
" 11,	125,000,000	3,800	26	99.3	99.0 (99.4)	0.82
Commenced to use Bacillus Prodigiosus.						
Nov. 23,	120,000,000	15,850	218	98.6	......	0.60
" 24,	132,000,000	14,000	364	97.4	......	0.59
Dec. 2,	125,000,000	6,000	190	96.8	......	‖ 0.50
" 4,	128,000,000	4,475	91	98.0	......	0.60
1894.						
Jan. 2,	132,000,000	2,850	178	93.8	......	0.85
" 3,	137,000,000	3,375	192	94.3	......	0.84
" 4,	132,000,000	5,025	136	97.3	......	0.85
" 5,	130,000,000	3,775	142	96.2	......	0.82
" § 8,	130,000,000	4,000	360	91.0	95.9 (96.8)	0.58
Ceased to use Bacillus Prodigiosus.						

TABLE NO. 2.—CONCLUDED.

Date.	Gallons of Water Filtered per Acre, per 24 Hours.	Bacteria per Cubic Centimeter. In Applied Water.	Bacteria per Cubic Centimeter. In Filtered Water.	Per cent. of the Applied Bacteria Removed.	Average Percentage of the Applied Bacteria Removed.	Grains of Sulphate of Alumina used per Gallon.
1894.						
Jan. 9,	130,000,000	3,400	148	95.6	......	0.60
" 10,	134,000,000	1,725	108	93.7	......	0.84
" 11,	130,000,000	2,150	84	96.1	......	0.61
" 12,	132,000,000	875	274	68.7	......	0.81
" 13,	132,000,000	1,633	68	95.8	......	0.72
" 15,	134,000,000	1,600	184	88.5	......	0.84
" 16,	134,000,000	775	178	77.0	......	0.58
" 17,	130,000,000	3,375	150	95.6	......	0.82
" 18,	134,000,000	3,800	162	95.7	......	0.59
" 19,	136,000,000	2,767	206	92.6	......	0.83
" 20,	130,000,000	5,200	230	95.6	......	0.72
" 22,	132,000,000	11,200	346	96.9	......	0.85
" 23,	132,000,000	4,133	278	93.3	91.2 (94.3)	0.80
Washed filter-bed with Caustic Soda.						
Jan. 24,	128,000,000	5,025	24	99.5	......	0.60
" 25,	125,000,000	3,600	36	99.0	......	0.82
" 26,	128,000,000	10,700	117	98.9	......	0.58
" 27,	128,000,000	7,567	123	98.4	......	0.58
" 29,	128,000,000	3,100	120	96.1	......	0.59
" 30,	130,000,000	3,000	70	97.7	98.3 (98.5)	0.58

* The counts from July 20 to July 21, and from Oct. 3 to Oct. 5, were made by Professor H. C. Ernst.

† One-half "Free Flow."

‡ One-half grain when sample was taken.

‖ Does not include "Free Flow" although it was used.

§ Temperature of Applied Water 71°.

TABLE No. 3.

FILTRATION EXPERIMENTS.—MORISON MECHANICAL FILTER.

Growths of about NINETY HOURS, of Water Bacteria in the Samples of Applied and Filtered Water that were taken at the SAME HOUR (which was One Hour or More after water commenced to flow from the filter).

DATE.		Gallons of Water Filtered per Acre, per 24 Hours.	Bacteria per Cubic Centimeter.		Per cent. of the Applied Bacteria Removed.	Average Percentage of the Applied Bacteria Removed.	Grains of Sulphate of Alumina used per Gallon.
			In Applied Water.	In Filtered Water.			
1893.							
July	*20,	125,000,000	2,000	11	99.5	......	0.75
"	21,	122,000,000	9,477	16	99.8	......	0.90
Oct.	3,	125,000,000	905	6	99.3	......	0.60
"	4,	128,000,000	610	2	99.7	......	0.58
"	5,	131,000,000	4,002	25	99.4	99.5	0.55
						(99.6)	
Oct.	17,	125,000,000	6,175+	26	99.6	......	†0.57
"	27,	122,000,000	9,700	41	99.6	.....	0.61
"	30,	128,000,000	1,700	7	99.6	......	0.56
"	31,	131,000,000	400	9	97.8	......	0.59
Nov.	1,	132,000,000	15,112	19	99.9	......	0.61
"	2,	123,000,000	6,950	26	99.6	......	0.81
"	3,	122,000,000	9,400	50	99.5	......	0.84
"	4.	132,000,000	3,400	63	98.1	......	‡1.20
"	9,	125,000,000	2,200	26	98.8	......	0.60
"	11,	125,000,000	3,650	25	99.3	99.2	0.82
						(99.5)	
Commenced to use Bacillus Prodigiosus.							
Nov.	23,	120,000,000	15,850	218	98.6	......	0.60
"	24,	132,000,000	7,600	364	95.2	......	0.59
Dec.	2,	128,000,000	4,900	190	96.1	......	‖0.75
"	4,	128,000,000	4,475	91	98.0	......	0.60
1894.							
Jan.	2,	132,000,000	2,150	94	95.6	......	0.85
"	3,	137,000,000	2,000	118	94.1	......	0.84
"	4,	134,000,000	2,275	44	98.1	......	0.85
"	5,	130,000,000	1,925	60	96.9	......	0.82
"	§ 8,	130,000,000	2,375	184	92.3	96.1	0.58
						(96.9)	
Ceased to use Bacillus Prodigiosus.							

TABLE NO. 3.—CONCLUDED.

Date.	Gallons of Water Filtered per Acre, per 24 Hours.	Bacteria per Cubic Centimeter. In Applied Water.	Bacteria per Cubic Centimeter. In Filtered Water.	Per cent. of the Applied Bacteria Removed.	Average Percentage of the Applied Bacteria Removed.	Grains of Sulphate of Alumina used per Gallon.
1894.						
Jan. 9,	130,000,000	1,850	54	97.1	......	0.60
" 10,	134,000,000	800	28	96.5	......	0.84
" 11,	130,000,000	750	20	97.3	......	0.61
" 12,	132,000,000	350	52	85.1	......	0.81
" 13,	132,000,000	600	36	94.0	......	0.72
" 15,	134,000,000	925	88	90.5	......	0.84
" 16,	134,000,000	375	44	88.3	......	0.58
" 17,	130,000,000	2,150	64	97.0	......	0.82
" 18,	134,000,000	1,500	62	95.9	......	0.59
" 19,	136,000,000	1,450	80	94.5	......	0.83
" 20,	130,000,000	2,800	58	97.9	......	0.72
" 22,	132,000,000	3,350	62	98.1	......	0.85
" 23,	132,000,000	2,300	64	97.2	94.6 (96.3)	0.80
	Washed filter-bed with Caustic Soda.					
Jan. 24,	128,000,000	2,100	6	99.7	......	0.60
" 25,	125,000,000	2,225	18	99.2	......	0.82
" 26,	128,000,000	4,650	54	98.8	......	0.58
" 27,	128,000,000	4,875	72	98.5	.....	0.58
" 29,	128,000,000	1,575	82	94.8	......	0.59
" 30,	130,000,000	1,400	28	98.0	98.2 (98.5)	0.58

* The counts from July 20 to July 21, and from Oct. 3 to Oct. 5, were made by Professor H. C. Ernst.

† One-half "Free Flow."

‡ One-half grain when sample was taken.

‖ Does not include "Free Flow" although it was used.

§ Temperature of Applied Water 71°.

TABLE NO. 4.

FILTRATION EXPERIMENTS.—MORISON MECHANICAL FILTER.

END GROWTHS, of Water Bacteria in all of the Samples of Filtered Water that were taken ONE HOUR OR MORE after water commenced to flow from the filter.

DATE.	Hour that Sample was taken.	Gallons of Water Filtered per Acre, per 24 Hours.	Bacteria per Cubic Centimeter. In Applied Water.	Bacteria per Cubic Centimeter. In Filtered Water.	Per cent. of the Applied Bacteria Removed.	Average Percentage of the Applied Bacteria Removed.	Grains of Sulphate of Alumina used per Gallon.
July *20, 1893.	10.00 A.M.	125,000,000	2,000	11	99.5	......	0.75
" 21, "	12 M.	122,000,000	9,477	16	99.8	......	0.90
Oct. 3, "	12 M.	125,000,000	905	6	99.3	......	0.60
" 4, "	12 M.	128,000,000	610	2	99.7	......	0.58
" 5, "	12 M.	131,000,000	4,002	25	99.4	99.5 (99.6)	0.55
Oct. 17, "	12 M.	125,000,000	6,175+	43	99.3	......	† 0.57
" 24, "	3.00 P.M.	125,000,000	13,020+	529	95.9	......	0.60
" 27, "	12 M.	122,000,000	10,700	44	99.6	......	0.61
" 30, "	12 M.	128,000,000	1,700	12	99.3	......	0.56
" 31, "	12 M.	131,000,000	500	16	96.8	......	0.59
Nov. 1, "	12 M.	132,000,000	21,200	28	99.9	......	0.61
" 2, "	12 M.	123,000,000	7,600	34	99.6	......	0.81
" 3, "	12 M.	122,000,000	12,500	66	99.5	......	0.84
" 4, "	12 M.	132,000,000	4,100	101	97.5	......	‡ 1.20
" 9, "	10.15 A.M.	125,000,000	3,300	35	98.9	......	0.85
" 10, "	10.00 A.M. End.	128,000,000	4,750	96	98.0	......	0.85

TABLE NO. 4.—CONTINUED.

Date.	Hour that Sample was taken.	Gallons of Water Filtered per Acre, per 24 Hours.	Bacteria per Cubic Centimeter. In Applied Water.	Bacteria per Cubic Centimeter. In Filtered Water.	Per cent. of the Applied Bacteria Removed.	Average Percentage of the Applied Bacteria Removed.	Grains of Sulphate of Alumina used per Gallon.
Nov. 11, 1893.	3.35 P.M.	125,000,000	3,800	26	99.3	98.6 (98.8)	0.82
			Commenced to use Bacillus Prodigiosus.				
Nov. 23, 1893.	9.00 A.M.	116,000,000	15,850	202	98.7	......	0.60
	11.00 A.M.	120,000,000	15,850	161	99.0	......	0.60
	12 M.	120,000,000	15,850	218	98.6	......	0.60
	1.00 P.M.	125,000,000	15,850	223	98.6	......	0.60
	3.40 P.M.	132,000,000	15,850	272	98.3	......	0.60
" 24, "	5.43 A.M. End.	128,000,000	15,850	712	95.5	......	0.60
	11.00 A.M.	132,000,000	14,000	661	95.3	......	0.59
	12 M.	132,000,000	14,000	364	97.4	.....	0.59
	1.00 P.M.	128,000,000	14,000	371	97.4	......	0.59
	2.00 P.M.	121,000,000	14,000	140	99.0	......	0.59
Dec. 2, "	9.30 A.M.	128,000,000	6,000	132	97.8	......	‖ 0.50
	10.30 A.M.	125,000,000	6,000	220	96.3	......	‖ 0.50
	11.30 A.M.	125,000,000	6,000	190	96.8	......	‖ 0.50
	2.30 P.M.	125,000,000	6,000	84	98.6	......	‖ 0.75
	3.40 P.M.	125,000,000	6,000	120	98.0	......	‖ 0.75
" 4, "	12 M.	128,000,000	4,475	91	98.0	......	0.60
" 7, "	4.55 A.M.	128,000,000	4,000	80	98.0	......	0.59
" 8, "	11.00 A.M. End.	134,000,000	2,700	37	98.6	......	0.60
" 12, "	10.30 A.M.	125,000,000	3,200	132	95.9	......	0.58

Dec. 14, 1893.	9.30 A.M.		136,000,000	4,950	168	96.6	......	0.59
Jan. 2, 1894.	12.30 P.M.		132,000,000	2,850	178	93.8	......	0.85
	3.40 P.M.		130,000,000	2,850	190	93.3	......	0.85
" 3, "	12.30 P.M.		137,000,000	3,375	192	94.3	......	0.84
	1.30 P.M.		137,000,000	3,375	178	94.7	......	0.84
	3.40 P.M.		136,000,000	3,375	194	94.3	......	0.84
" 4, "	3.30 A.M. End.		128,000,000	3,375	158	95.3	......	0.84
	1.30 P.M.		132,000,000	5,025	136	97.3	......	0.85
	3.40 P.M.		130,000,000	5,025	131	97.4	......	0.85
" 5, "	3.50 A.M. End.		130,000,000	5,025	148	97.1	......	0.85
	12.30 P.M.		130,000,000	3,775	142	96.2	......	0.82
" 6, "	3.40 A.M. End.		125,000,000	3,775	137	96.4	......	0.82
" §8, "	9.30 A.M.		142,000,000	4,000	402	90.0	......	0.58
	12.30 P.M.		130,000,000	4,000	360	91.0	......	0.58
	1.30 P.M.		128,000,000	4,000	372	90.7	......	0.58
	3.40 P.M.		128,000,000	4,000	480	88.0	96.1 (96.9)	0.58
			Ceased to use Bacillus Prodigiosus.					
Jan. 9, 1894.	9.30 A.M.		142,000,000	3,400	138	95.9	......	0.60
	12.30 P.M.		130,000,000	3,400	148	95.6	......	0.60
	1.30 P.M.		132,000,000	3,400	102	97.0	......	0.60
	3.40 P.M.		130,000,000	3,400	74	97.8	......	0.60
" 10, "	3.30 A.M. End.		125,000,000	3,400	38	98.9	......	0.60
	9.30 A.M.		142,000,000	1,725	88	94.9	......	0.84
	12.30 P.M.		134,000,000	1,725	108	93.7	......	0.84
" 11, "	3.40 A.M. End.		128,000,000	1,725	42	97.6	......	0.84
	9.30 A.M.		132,000,000	2,150	54	97.5	......	0.61
	12.30 P.M.		130,000,000	2,150	84	96.1	......	0.61
	1.30 P.M.		132,000,000	2,150	68	96.8	......	0.61

TABLE NO. 4.—CONTINUED.

Date.	Hour that Sample was taken.	Gallons of Water Filtered per Acre, per 24 Hours.	Bacteria per Cubic Centimeter. In Applied Water.	Bacteria per Cubic Centimeter. In Filtered Water.	Per cent. of the Applied Bacteria Removed.	Average Percentage of the Applied Bacteria Removed.	Grains of Sulphate of Alumina used per Gallon.
Jan. 11, 1894.	3.40 P.M.	128,000,000	2,150	74	96.6	......	0.61
" 12, "	5.30 A.M. End.	125,000,000	2,150	66	96.9	......	0.61
	9.30 A.M.	134,000,000	875	132	84.9	......	0.81
	12.30 P.M.	132,000,000	875	274	68.7	......	0.81
	1.30 P.M.	130,000,000	875	90	89.7	......	0.81
	3.40 P.M.	128,000,000	875	98	88.8	......	0.81
" 13, "	3.40 A.M. End.	121,000,000	875	38	95.7	......	0.81
	9.30 A.M.	130,000,000	1,633	72	95.6	......	0.72
	12.30 P.M.	132,000,000	1,633	68	95.8	......	0.72
	1.30 P.M.	130,000,000	1,633	66	96.0	......	0.72
	3.30 P.M.	128,000,000	1,633	48	97.1	......	0.72
" 15, "	9.30 A.M.	132,000,000	1,600	104	93.5	......	0.84
	12.30 P.M.	134,000,000	1,600	184	88.5	......	0.84
	1.30 P.M.	136,000,000	1,600	294	81.6	......	0.84
	3.40 P.M.	132,000,000	1,600	318	80.1	......	0.84
" 16, "	3.50 A.M. End.	125,000,000	1,600	264	83.5	......	0.84
	9.30 A.M.	142,000,000	775	162	79.1	......	0.58
	12.30 P.M.	134,000,000	775	178	77.0	......	0.58
	1.30 P.M.	134,000,000	775	142	81.7	......	0.58
	3.40 P.M.	132,000,000	775	150	80.6	......	0.58
" 17, "	5.30 A.M. End.	128,000,000	775	134	82.7	......	0.58
	9.30 A.M.	128,000,000	3,375	162	95.2	......	0.82
	12.30 P.M.	130,000,000	3,375	150	95.6	......	0.82

Jan. 17, 1894.	1.30 P.M.		130,000,000	3,375	142	95.8	......	0.82
	3.40 P.M.		128,000,000	3,375	150	95.6	......	0.82
" 18, "	3.40 A.M.	End.	125,000,000	3,375	74	97.8	......	0.82
	9.30 A.M.		132,000,000	3,800	142	96.3	......	0.59
	12.30 P.M.		134,000,000	3,800	162	95.7	......	0.59
	1.30 P.M.		132,000,000	3,800	186	95.1	......	0.59
	3.40 P.M.		130,000,000	3,800	154	95.9	......	0.59
" 19, "	5.30 A.M.	End.	128,000,000	3,800	82	97.8	......	0.59
	9.30 A.M.		142,000,000	2,767	204	92.6	......	0.83
	12.30 P.M.		136,000,000	2,767	206	92.6	......	0.83
	1.30 P.M.		134,000,000	2,767	160	94.2	......	0.83
	3.40 P.M.		132,000,000	2,767	148	94.7	......	0.83
" 20, "	3.50 A.M.	End.	128,000,000	2,767	116	95.8	......	0.83
	9.30 A.M.		136,000,000	5,200	150	97.1	......	0.72
	12.30 P.M.		130,000,000	5,200	230	95.6	......	0.72
	1.30 P.M.		130,000,000	5,200	234	95.5	......	0.72
	3.30 P.M.		130,000,000	5,200	216	95.8	......	0.72
" 22, "	9.30 A.M.		142,000,000	11,200	396	96.5	......	0.85
	12.30 P.M.		132,000,000	11,200	346	96.9	......	0.85
	1.30 P.M.		132,000,000	11,200	382	96.6	......	0.85
	3.40 P.M.		130,000,000	11,200	344	96.9	......	0.85
" 23, "	3.45 A.M.	End.	125,000,000	11,200	222	98.0	......	0.85
	9.30 A.M.		142,000,000	4,133	258	93.8	......	0.80
	12.30 P.M.		132,000,000	4,133	278	93.3	92.8 (95.2)	0.80
			Washed filter-bed with Caustic Soda.					
Jan. 24, 1894.	9.30 A.M.		132,000,000	5,025	42	99.2	......	0.60
	12.30 P.M.		128,000,000	5,025	24	99.5	......	0.60
	1.30 P.M.		128,000,000	5,025	30	99.4	......	0.60
	3.40 P.M.		128,000,000	5,025	34	99.3	......	0.60

TABLE No. 4.—CONCLUDED.

Date.	Hour that Sample was taken.	Gallons of Water Filtered per Acre, per 24 Hours.	Bacteria per Cubic Centimeter.		Per cent. of the Applied Bacteria Removed.	Average Percentage of the Applied Bacteria Removed.	Grains of Sulphate of Alumina used per Gallon.
			In Applied Water.	In Filtered Water.			
Jan. 25, 1894.	5.30 A.M. End.	128,000,000	5,025	32	99.4	......	0.60
	9.30 A.M.	128,000,000	3,600	55	98.5	......	0.82
	12.30 P.M.	125,000,000	3,600	36	99.0	......	0.82
	1.30 P.M.	125,000,000	3,600	30	99.2	......	0.82
	3.40 P.M.	128,000,000	3,600	40	98.9	......	0.82
" 26, "	3.45 A.M.	121,000,000	3,600	34	99.1	......	0.82
	12 M.	128,000,000	10,700	117	98.9	......	0.58
	3.40 P.M.	128,000,000	10,700	66	99.4	......	0.58
" 27, "	5.35 A.M. End.	125,000,000	10,700	86	99.2	......	0.58
	9.30 A.M.	128,000,000	7,567	135	98.2	......	0.58
	12.30 P.M.	128,000,000	7,567	123	98.4	......	0.58
" 29, "	12 M.	128,000,000	3,100	120	96.1	......	0.59
" 30, "	5.30 A.M. End.	128,000,000	3,100	54	98.3	......	0.59
	12 M.	130,000,000	3,000	70	97.7	98.8 (98.9)	0.58

* The counts from July 20 to July 21, and from Oct. 3 to Oct. 5, were made by Prof. H. C. Ernst.

† One-half "Free Flow."

‡ One-half grain when sample was taken.

‖ Does not include "Free Flow" although it was used.

§ Temperature of Applied Water on this date 71°.

"End" in second column signifies end of run.

TABLE NO. 5.

FILTRATION EXPERIMENTS.—MORISON MECHANICAL FILTER.

Growths of Water Bacteria of EIGHTY FIVE HOURS OR MORE AND END GROWTHS, in all of the Samples of Filtered Water that were taken ONE HOUR OR MORE after water commenced to flow from the filter.

DATE.	Hour that Sample was taken.	Gallons of Water Filtered per Acre, per 24 Hours.	Bacteria per Cubic Centimeter.		Per cent. of the Applied Bacteria Removed.	Average Percentage of the Applied Bacteria Removed.	Grains of Sulphate of Alumina used per Gallon.
			In Applied Water.	In Filtered Water.			
Oct. 17, 1893.	12 M.	125,000,000	6,175+	43	99.3	......	*0.57
" 23, "	12 M.	196,000,000	11,700	76	99.4	......	0.86
" 24, "	3.00 P.M.	125,000,000	13,020+	529	95.9	......	0.60
" 27, "	12 M.	122,000,000	10,700	44	99.6	......	0.61
" 30, "	12 M.	128,000,000	1,700	12	99.3	......	0.56
" 31, "	12 M.	131,000,000	500	16	96.8	......	0.59
Nov. 1, "	12 M.	132,000,000	21,200	28	99.9	.....	0.61
" 2, "	12 M.	123,000,000	7,600	34	99.6	......	0.81
" 3, "	12 M.	122,000,000	12,500	66	99.5	.....	0.84
" 4, "	12 M.	132,000,000	4,100	101	97.5	......	†1.20
" 9, "	10.15 A.M.	125,000,000	3,300	35	98.9	.....	0.85
" 10, "	10.00 A.M.	128,000,000	4,750	96	98.0	......	0.85
" 11, "	3.35 P.M.	125,000,000	3,800	26	99.3	.....	0.82
" 15, "	3.35 P.M.	125,000,000	3,800	52	98.6	......	0.88
" 17, "	3.35 P.M.	125,000,000	24,600	70	99.7	.....	0.85

9

TABLE NO. 5.—CONTINUED.

Date.	Hour that Sample was taken.	Gallons of Water Filtered per Acre, per 24 Hours.	Bacteria per Cubic Centimeter.		Per cent. of the Applied Bacteria Removed.	Average Percentage of the Applied Bacteria Removed.	Grains of Sulphate of Alumina used per Gallon.
			In Applied Water.	In Filtered Water.			
Nov. 18, 1893.	3.35 P.M.	132,000,000	15,700	55	99.6	98.8 (99.1)	0.61
			Commenced to use Bacillus Prodigiosus.				
Nov. 23, 1893.	9.00 A.M.	116,000,000	15,850	202	98.7	......	0.60
	11.00 A.M.	120,000,000	15,850	161	99.0	......	0.60
	12 M.	120,000,000	15,850	218	98.6	......	0.60
	1.00 P.M.	125,000,000	15,850	223	98.6	......	0.60
	2.00 P.M.	128,000,000	15,850	198	98.8	......	0.60
	3.00 P.M.	132,000,000	15,850	193	98.8	......	0.60
	3.40 P.M.	132,000,000	15,850	272	98.3	......	0.60
" 24, "	5.43 A.M.	128,000,000	15,850	712	95.5	......	0.60
	9.00 A.M.	146,000,000	14,000	705	95.0	......	0.59
	10.00 A.M.	146,000,000	14,000	441	96.9	......	0.59
	11.00 A.M.	132,000,000	14,000	661	95.3	......	0.59
	12 M.	132,000,000	14,000	364	97.4	......	0.59
	1.00 P.M.	128,000,000	14,000	371	97.4	......	0.59
	2.00 P.M.	121,000,000	14,000	140	99.0	......	0.59
	3.00 P.M.	121,000,000	14,000	130	99.1	......	0.59
	3.40 P.M.	132,000,000	14,000	137	99.0	......	0.59
" 25, "	10.00 A.M.	125,000,000	6,400	294	95.4	......	0.61
" 28, "	9.30 A.M.	128,000,000	4,200	336	92.0	......	0.61
	10.30 A.M.	132,000,000	4,200	210	95.0	......	0.61

Nov. 28, 1893.	11.30 A.M.	132,000,000	4,200	234	94.4	......	0.61
	12.15 P.M.	128,000,000	4,200	57	98.6	......	0.61
	12.30 P.M.	128,000,000	4,200	224	94.7	......	0.61
Dec. 2, "	9.30 A.M.	128,000,000	6,000	132	97.8	......	‡ 0.50
	10.30 A.M.	125,000,000	6,000	220	96.3	......	‡ 0.50
	11.30 A.M.	125,000,000	6,000	190	96.8	......	‡ 0.50
	12.30 P.M.	128,000,000	6,000	143	97.6	......	‡ 0.75
	1.30 P.M.	128,000,000	6,000	103	98.3	......	‡ 0.75
	2.30 P.M.	125,000,000	6,000	84	98.6	......	‡ 0.75
	3.40 P.M.	125,000,000	6,000	120	98.0	......	‡ 0.75
" 4, "	12 M.	128,000,000	4,475	91	98.0	......	0.60
" 7, "	4.55 A.M.	128,000,000	4,000	80	98.0	......	0.59
" 8, "	11.00 A.M.	134,000,000	2,700	37	98.6	......	0.60
" 9, "	10.00 A.M.	132,000,000	3,400	41	98.8	......	0.58
" 12, "	9.30 A.M.	128,000,000	3,200	130	95.9	......	0.58
	10.30 A.M.	125,000,000	3,200	132	95.9	......	0.58
	11.30 A.M.	128,000,000	3,200	220	93.1	......	0.58
	12.30 P.M.	128,000,000	3,200	133	95.8	......	0.58
	1.30 P.M.	125,000,000	3,200	69	97.8	......	0.58
	2.30 P.M.	131,000,000	3,200	118	96.3	......	0.58
	3.40 P.M.	128,000,000	3,200	101	96.8	......	0.58
" 13, "	5.30 A.M.	128,000,000	3,200	65	98.0	......	0.58
	9.30 A.M.	134,000,000	3,833	217	94.3	......	0.60
	10.30 A.M.	134,000,000	3,833	·194	94.9	......	0.60
	11.30 A.M.	137,000,000	3,833	156	95.9	......	0.60
	12.30 P.M.	134,000,000	3,833	173	95.5	......	0.60
	1.30 P.M.	134,000,000	3,833	150	96.1	......	0.60
	2.30 P.M.	130,000,000	3,833	121	96.8	......	0.60
	3.40 P.M.	132,000,000	3,833	124	96.8	......	0.60
" 14, "	5.15 A.M.	132,000,000	3,833	71	98.1	......	0.60

TABLE NO. 5.—CONTINUED.

Date.	Hour that Sample was taken.	Gallons of Water Filtered per Acre, per 24 Hours.	Bacteria per Cubic Centimeter. In Applied Water.	Bacteria per Cubic Centimeter. In Filtered Water.	Per cent. of the Applied Bacteria Removed.	Average Percentage of the Applied Bacteria Removed.	Grains of Sulphate of Alumina used per Gallon.
Dec. 14, 1893.	9.30 A.M.	136,000,000	4,950	168	96.6	......	0.59
	10.30 A.M.	137,000,000	4,950	201	95.9	......	0.59
	11.30 A.M.	136,000,000	4,950	73	98.5	......	0.59
	12.30 P.M.	134,000,000	4,950	172	96.5	......	0.59
	1.30 P.M.	134,000,000	4,950	73	98.5	......	0.59
	2.30 P.M.	134,000,000	4,950	88	98.2	......	0.59
	3.40 P.M.	132,000,000	4,950	132	97.3	......	0.59
" 15, "	5.35 A.M.	132,000,000	1,900	26	98.6	......	0.59
	9.30 A.M.	137,000,000	1,900	57	97.0	......	0.66
	10.30 A.M.	132,000,000	1,900	83	95.6	......	0.66
	11.30 A.M.	132,000,000	1,900	59	96.9	......	0.66
	12.30 P.M.	134,000,000	1,900	71	96.3	......	0.66
	1.30 P.M.	130,000,000	1,900	61	96.8	......	0.66
	2.30 P.M.	128,000,000	1,900	53	97.2	......	0.66
	3.40 P.M.	132,000,000	1,900	83	95.6	......	0.66
" 16, "	4.35 A.M.	132,000,000	1,900	44	97.7	......	0.66
	10.00 A.M.	132,000,000	5,900	176	97.0	......	0.74
	11.00 A.M.	132,000,000	5,900	184	96.9	......	0.74
	12 M.	134,000,000	5,900	182	96.9	......	0.74
	1.00 P.M.	132,000,000	5,900	138	97.7	......	0.74
	2.00 P.M.	131,000,000	5,900	78	98.7	......	0.74
	3.00 P.M.	134,000,000	5,900	96	98.4	......	0.74
	3.30 P.M.	131,000,000	5,900	94	98.4	......	0.74

Dec. 18, 1893.	9.30 A.M.	131,000,000	8,200	228	97.2	......	0.59
	1.30 P.M.	128,000,000	8,200	336	95.9	......	0.59
	2.30 P.M.	131,000,000	8,200	322	96.1	......	0.59
	3.40 P.M.	128,000,000	8,200	302	96.3	......	0.59
" 19, "	4.40 A.M.	128,000,000	8,200	102	98.8	......	0.59
" 20, "	4.35 A.M.	132,000,000	5,350	124	97.7	......	0.58
	1.30 P.M.	128,000,000	5,350	112	97.9	......	0.60
	2.30 P.M.	130,000,000	5,350	126	97.6	......	0.60
	3.40 P.M.	128,000,000	5,350	116	97.8	......	0.60
" 21, "	5.30 A.M.	130,000,000	5,350	60	98.9	......	0.60
	9.30 A.M.	156,000,000	6,400	76	98.8	......	0.61
	10.30 A.M.	138,000,000	6,400	58	99.1	......	0.61
	11.30 A.M.	132,000,000	6,400	80	98.8	......	0.61
	12.30 P.M.	132,000,000	6,400	69	98.9	......	0.61
	1.30 P.M.	130,000,000	6,400	61	99.0	......	0.61
	2.30 P.M.	128,000,000	6,400	74	98.8	......	0.61
	3.40 P.M.	121,000,000	6,400	100	98.4	......	0.61
" 23, "	9.30 A.M.	146,000,000	6,100	136	97.8	......	0.72
	10.30 A.M.	142,000,000	6,100	152	97.5	......	0.72
	11.30 A.M.	136,000,000	6,100	151	97.5	......	0.72
	12.30 P.M.	134,000,000	6,100	95	98.4	......	0.72
	1.30 P.M.	132,000,000	6,100	119	98.0	......	0.72
	2.30 P.M.	132,000,000	6,100	121	98.0	......	0.72
	3.30 P.M.	132,000,000	6,100	206	96.6	......	0.72
Jan. 1, 1894.	9.30 A.M.	132,000,000	2,100	400	81.0	......	0.82
	1.30 P.M.	132,000,000	2,775	358	87.1	......	0.82
	3.40 P.M.	130,000,000	2,775	630	77.3	......	0.82
" 2, "	3.35 A.M.	128,000,000	2,525	770	69.5	......	0.82
	9.30 A.M.	147,000,000	2,775	158	94.3	......	0.85
	12.30 P.M.	132,000,000	2,850	178	93.8	......	0.85

TABLE No. 5.—CONTINUED.

Date.	Hour that Sample was taken.	Gallons of Water Filtered per Acre, per 24 Hours.	Bacteria per Cubic Centimeter. In Applied Water.	Bacteria per Cubic Centimeter. In Filtered Water.	Per cent. of the Applied Bacteria Removed.	Average Percentage of the Applied Bacteria Removed.	Grains of Sulphate of Alumina used per Gallon.
Jan. 2, 1894.	1.30 P.M.	132,000,000	2,525	264	89.5	......	0.85
	3.40 P.M.	130,000,000	2,850	190	93.3	......	0.85
" 3, "	4.30 A.M.	130,000,000	2,850	136	95.2	......	0.85
	9.30 A.M.	142,000,000	2,725	64	97.7	......	0.84
	12.30 P.M.	137,000,000	3,375	192	94.3	......	0.84
	1.30 P.M.	137,000,000	3,375	178	94.7	......	0.84
	3.40 P.M.	136,000,000	3,375	194	94.3	......	0.84
" 4, "	3.30 A.M.	128,000,000	3,375	158	95.3	......	0.84
	9.30 A.M.	148,000,000	3,500	72	97.9	......	0.85
	12.30 P.M.	134,000,000	3,500	44	98.7	......	0.85
	1.30 P.M.	132,000,000	5,025	136	97.3	......	0.85
	3.40 P.M.	130,000,000	5,025	131	97.4	......	0.85
" 5, "	3.50 A.M.	130,000,000	5,025	148	97.1	......	0.85
	9.30 A.M.	136,000,000	3,600	154	95.7	......	0.82
	12.30 P.M.	130,000,000	3,775	142	96.2	......	0.82
	1.30 P.M.	132,000,000	3,600	148	95.9	......	0.82
	3.40 P.M.	130,000,000	3,775	382	89.9	......	0.82
" 6, "	3.40 A.M.	125,000,000	3,775	137	96.4	......	0.82
	12.30 P.M.	146,000,000	2,700	332	87.7	......	1.00
	1.30 P.M.	138,000,000	2,700	196	92.7	......	1.00
	3.40 P.M.	132,000,000	2,700	186	93.1	......	1.00
" 8, "	9.30 A.M.	142,000,000	4,000	402	90.0	......	0.58
	12.30 P.M.	130,000,000	4,000	360	91.0	......	0.58

Jan. ‖ 8, 1894.	1.30 P.M.	128,000,000	4,000	372	90.7	......	0.58
‖	3.40 P.M.	128,000,000	4,000	480	88.0	......	0.58
" 9, "	5.30 A.M.	128,000,000	4,000	568	85.8	95.9 (96.8)	0.58
Ceased to use Bacillus Prodigiosus.							
Jan. 9, 1894.	9.30 A.M.	142,000,000	3,400	138	95.9	......	0.60
	12.30 P.M.	130,000,000	3,400	148	95.6	......	0.60
	1.30 P.M.	132,000,000	3,400	102	97.0	......	0.60
	3.40 P.M.	130,000,000	3,400	74	97.8	......	0.60
" 10, "	3.30 A.M.	125,000,000	3,400	38	98.9	......	0.60
	9.30 A.M.	142,000,000	1,725	88	94.9	......	0.84
	12.30 P.M.	134,000,000	1,725	108	93.7	......	0.84
" 11, "	3.40 A.M.	128,000,000	1,725	42	97.6	......	0.84
	9.30 A.M.	132,000,000	2,150	54	97.5	......	0.61
	12.30 P.M.	130,000,000	2,150	84	96.1	......	0.61
	1.30 P.M.	132,000,000	2,150	68	96.8	......	0.61
	3.40 P.M.	128,000,000	2,150	74	96.6	......	0.61
" 12, "	5.30 A.M.	125,000,000	2,150	66	96.9	......	0.61
	9.30 A.M.	134,000,000	875	132	84.9	......	0.81
	12.30 P.M.	132,000,000	875	274	68.7	......	0.81
	1.30 P.M.	130,000,000	875	90	89.7	......	0.81
	3.40 P.M.	128,000,000	875	98	88.8	......	0.81
" 13, "	3.40 A.M.	121,000,000	875	38	95.7	......	0.81
	9.30 A.M.	130,000,000	1,633	72	95.6	......	0.72
	12.30 P.M.	132,000,000	1,633	68	95.8	......	0.72
	1.30 P.M.	130,000,000	1,633	66	96.0	......	0.72
	3.30 P.M.	128,000,000	1,633	48	97.1	......	0.72
" 15, "	9.30 A.M.	132,000,000	1,600	104	93.5	......	0.84
	12.30 P.M.	134,000,000	1,600	184	88.5	......	0.84
	1.30 P.M.	136,000,000	1,600	294	81.6	......	0.84

TABLE NO. 5.—CONCLUDED.

Date.	Hour that Sample was taken.	Gallons of Water Filtered per Acre, per 24 Hours.	Bacteria per Cubic Centimeter.		Per cent. of the Applied Bacteria Removed.	Average Percentage of the Applied Bacteria Removed.	Grains of Sulphate of Alumina used per Gallon.
			In Applied Water.	In Filtered Water.			
Jan. 15, 1894.	3.40 P.M.	132,000,000	1,600	318	80.1	......	0.84
" 16, "	3.50 A.M.	125,000,000	1,600	264	83.5	......	0.84
	9.30 A.M.	142,000,000	775	162	79.1	......	0.58
	12.30 P.M.	134,000,000	775	178	77.0	......	0.58
	1.30 P.M.	134,000,000	775	142	81.7	......	0.58
	3.40 P.M.	132,000,000	775	150	80.6	......	0.58
" 17, "	5.30 A.M.	128,000,000	775	134	82.7	......	0.58
	9.30 A.M.	128,000,000	3,375	162	95.2	......	0.82
	12.30 P.M.	130,000,000	3,375	150	95.6	......	0.82
	1.30 P.M.	130,000,000	3,375	142	95.8	......	0.82
	3.40 P.M.	128,000,000	3,375	150	95.6	......	0.82
" 18, "	3.40 A.M.	125,000,000	3,375	74	97.8	......	0.82
	9.30 A.M.	132,000,000	3,800	142	96.3	......	0.59
	12.30 P.M.	134,000,000	3,800	162	95.7	......	0.59
	1.30 P.M.	132,000,000	3,800	186	95.1	......	0.59
	3.40 P.M.	130,000,000	3,800	154	95.9	......	0.59
" 19, "	5.30 A.M.	128,000,000	3,800	82	97.8	......	0.59
	9.30 A.M.	142,000,000	2,767	204	92.6	......	0.83
	12.30 P.M.	136,000,000	2,767	206	92.6	......	0.83
	1.30 P.M.	134,000,000	2,767	160	94.2	......	0.83
	3.40 P.M.	132,000,000	2,767	148	94.7	......	0.83
" 20, "	3.50 A.M.	128,000,000	2,767	116	95.8	......	0.83
	9.30 A.M.	136,000,000	5,200	150	97.1	......	0.72
	12.30 P.M.	130,000,000	5,200	230	95.6	......	0.72

Jan. 20, 1894.	1.30 P.M.	130,000,000	5,200	234	95.5	......	0.72
	3.30 P.M.	130,000,000	5,200	216	95.8	......	0.72
" 22, "	9.30 A.M.	142,000,000	11,200	396	96.5	......	0.85
	12.30 P.M.	132,000,000	11,200	346	96.9	......	0.85
	1.30 P.M.	132,000,000	11,200	382	96.6	......	0.85
	3.40 P.M.	130,000,000	11,200	344	96.9	......	0.85
" 23, "	3.45 A.M.	125,000,000	11,200	222	98.0	......	0.85
	9.30 A.M.	142,000,000	4,133	258	93.8	......	0.80
	12.30 P.M.	132,000,000	4,133	278	93.3	92.8 (95.2)	0.80
		Washed filter-bed with Caustic Soda.					
Jan. 24, 1894.	9.30 A.M.	132,000,000	5,025	42	99.2	......	0.60
	12.30 P.M.	128,000,000	5,025	24	99.5	......	0.60
	1.30 P.M.	128,000,000	5,025	30	99.4	......	0.60
	3.40 P.M.	128,000,000	5,025	34	99.3	......	0.60
" 25, "	5.30 A.M.	128,000,000	5,025	32	99.4	......	0.60
	9.30 A.M.	128,000,000	3,600	55	98.5	......	0.82
	12.30 P.M.	125,000,000	3,600	36	99.0	......	0.82
	1.30 P.M.	125,000,000	3,600	30	99.2	......	0.82
	3.40 P.M.	128,000,000	3,600	40	98.9	......	0.82
" 26, "	3.45 A.M.	121,000,000	3,600	34	99.1	......	0.82
	12 M.	128,000,000	10,700	117	98.9	......	0.58
	3.40 P.M.	128,000,000	10,700	66	99.4	......	0.58
" 27, "	5.35 A.M.	125,000,000	10,700	86	99.2	......	0.58
	9.30 A.M.	128,000,000	7,567	135	98.2	......	0.58
	12.30 P.M.	128,000,000	7,567	123	98.4	......	0.58
" 29, "	12 M.	128,000,000	3,100	120	96.1	......	0.59
" 30, "	5.30 A.M.	128,000,000	3,100	54	98.3	......	0.59
	12 M.	130,000,000	3,000	70	97.7	98.8 (98.9)	0.58

* One-half " Free Flow."
† One-half grain when sample was taken.
‡ Does not include " Free Flow " although it was used.
Temperature of Applied Water 71°.

TABLE NO. 6.

FILTRATION EXPERIMENTS.—MORISON MECHANICAL FILTER.

END GROWTHS, of Water Bacteria in the Samples of Filtered Water that were taken THIRTY MINUTES OR LESS after water commenced to flow from the filter.

DATE.	Minutes after Flow.	Gallons of Water Filtered per Acre, per 24 Hours.	Bacteria per Cubic Centimeter. In Applied Water.	Bacteria per Cubic Centimeter. In Filtered Water.	Per cent. of the Applied Bacteria Removed.	Average Percentage of the Applied Bacteria Removed.	Grains of Sulphate of Alumina used per Gallon.
Oct. *6, 1893	20	131,000,000	7,795	60	99.2	99.2	0.60
Oct. 17, "	21	110,000,000	6,175+	82	98.7	......	† 0.57
" 27, "	18	116,000,000	10,700	431	96.0	......	0.61
" 30, "	18	106,000,000	1,700	66	96.1	......	0.56
Nov. 2, "	16	116,000,000	7,900	134	98.3	......	0.81
" 3, "	22	116,000,000	11,450	113	99.0	......	0.84
" 4, "	18	102,000,000	4,100	344	91.6	......	‡ 1.20
" 11, "	15	104,000,000	3,650	252	93.1	96.1 (96.9)	0.82
Commenced to use Bacillus Prodigiosus.							
Nov. 23, 1893	21	99,000,000	15,850	536	96.6	.....	0.60
" 24, "	30	132,000,000	14,000	1,103	92.1	......	0.59
Dec. 1, "	30	128,000,000	2,850	420	85.3	......	0.97
" 2, "	30	112,000,000	6,000	270	95.5	......	0.74
" 4, "	30	119,000,000	4,475	278	93.8	.....	0.60
" 7, "	30	98,000,000	4,000	91	97.7	......	0.60
Jan. 1, 1894	30	128,000,000	2,533	708	72.0	......	0.82
" 2, "	30	128,000,000	2,850	358	87.4	......	0.85

Jan. 3, 1894	30	136,000,000	3,375	304	91.0	......	0.84
" 4, "	30	148,000,000	5,025	202	96.0	......	0.85
" 5, "	30	134,000,000	3,775	226	94.0	......	0.82
" ‖ 6, "	30	136,000,000	2,700	256	90.5	......	1.00
" ‖ 8, "	30	137,000,000	4,000	430	89.3	90.9 (92.7)	0.58
		Ceased to use Bacillus Prodigiosus.					
Jan. 9, 1894	30	132,000,000	3,400	156	95.4	......	0.60
" 10, "	30	128,000,000	1,725	132	92.3	......	0.84
" 11, "	30	121,000,000	2,150	100	95.3	......	0.61
" 12, "	30	134,000,000	875	94	89.3	......	0.81
" 13, "	30	128,000,000	1,633	106	93.5	......	0.72
" 15, "	30	134,000,000	1,600	116	92.8	......	0.84
" 16, "	30	134,000,000	775	296	61.8	......	0.58
" 17, "	30	113,000,000	3,375	350	89.6	......	0.82
" 18, "	30	121,000,000	3,800	234	93.8	......	0.59
" 19, "	30	132,000,000	2,767	192	93.1	......	0.83
" 20, "	30	125,000,000	5,200	208	96.0	......	0.72
" 22, "	30	134,000,000	11,200	682	93.9	......	0.85
" 23, "	30	128,000,000	4,133	514	87.6	90.3 (92.5)	0.80
		Washed filter-bed with Caustic Soda.					
Jan. 24, 1894	30	128,000,000	5,025	166	96.7	......	0.60
" 25, "	30	128,000,000	3,600	144	96.0	......	0.82
" 26, "	30	128,000,000	10,700	286	97.3	......	0.58
" 27, "	30	132,000,000	7,567	77	99.0	......	‡ 1.01
" 29, "	30	128,000,000	3,100	76	97.5	......	0.59
" 30, "	30	128,000,000	3,000	312	89.6	96.0 (96.8)	0.58

* The count on Oct. 6 was made by Professor H. C. Ernst.
† One-half "Free Flow."
‡ One-half grain when samples were taken.
‖ Temperature of Applied Water 71°.

TABLE No. 7.

FILTRATION EXPERIMENTS.—MORISON MECHANICAL FILTER.

Growths of about NINETY HOURS, of Water Bacteria in the Samples of Filtered Water that were taken THIRTY MINUTES OR LESS after water commenced to flow from the filter.

DATE.	Minutes after Flow.	Gallons of Water Filtered per Acre, per 24 Hours.	Bacteria per Cubic Centimeter.		Per cent. of the Applied Bacteria Removed.	Average Percentage of the Applied Bacteria Removed.	Grains of Sulphate of Alumina used per Gallon.
			In Applied Water.	In Filtered Water.			
Oct. * 6, 1893	20	131,000,000	7,795	60	99.2	99.2	0.60
Oct. 17, "	21	110,000,000	6,175+	59	99.0	......	† 0.57
" 27, "	18	116,000,000	9,700	327	96.6	......	0.61
" 30, "	18	106,000,000	833	53	93.6	......	0.56
Nov. 2, "	16	116,000,000	6,950	92	98.7	......	0.81
" 3, "	22	116,000,000	9,400	82	99.1	......	0.84
" 4, "	18	102,000,000	3,400	184	94.6	......	‡ 1.20
" 11, "	15	104,000,000	3,650	252	93.1	96.4 (97.4)	0.82
			Commenced to use Bacillus Prodigiosus.				
Nov. 23, 1893	21	99,000,000	15,850	536	96.6	......	0.60
" 24, "	30	132,000,000	7,600	1,103	85.5	......	0.59
Dec. 1, "	30	128,000,000	2,500	420	83.2	......	0.97
" 2, "	30	112,000,000	4,900	270	94.5	......	0.74
" 4, "	30	119,000,000	4,475	278	93.8	......	0.60
" 7, "	30	98,000,000	4,000	91	97.7	......	0.60
Jan. 1, 1894	30	128,000,000	1,325	352	73.4	......	0.82
" 2, "	30	128,000,000	2,850	234	91.8	......	0.85

Jan. 3, 1894	30	136,000,000	2,000	142	92.9	......	0.84
" 4, "	30	148,000,000	2,275	76	96.7	......	0.85
" 5, "	30	134,000,000	1,925	92	95.2	......	0.82
" ‖ 6, "	30	136,000,000	1,400	158	88.7	......	1.00
" ‖ 8, "	30	137,000,000	2,375	264	88.9	90.7 (92.5)	0.58
		Ceased to use Bacillus Prodigiosus.					
Jan. 9, 1894	30	132,000,000	1,850	60	96.8	......	0.60
" 10, "	30	128,000,000	800	72	91.0	......	0.84
" 11, "	30	121,000,000	750	50	93.3	......	0.61
" 12, "	30	134,000,000	350	54	84.6	......	0.81
" 13, "	30	128,000,000	600	60	90.0	......	0.72
" 15, "	30	134,000,000	925	54	94.2	......	0.84
" 16, "	30	134,000,000	375	54	85.6	......	0.58
" 17, "	30	113,000,000	2,150	100	95.3	......	0.82
" 18, "	30	121,000,000	1,500	108	92.8	......	0.59
" 19, "	30	132,000,000	1,450	92	93.7	......	0.83
" 20, "	30	125,000,000	2,800	64	97.7	......	0.72
" 22, "	30	134,000,000	3,350	76	97.7	......	0.85
" 23, "	30	128,000,000	2,300	94	95.9	93.0 (95.1)	0.80
		Washed filter-bed with Caustic Soda.					
Jan. 24, 1894	30	128,000,000	2,100	88	95.8	......	0.60
" 25, "	30	128,000,000	2,225	108	95.1	......	0.82
" 26, "	30	128,000,000	4,650	136	97.1	......	0.58
" 27, "	30	132,000,000	4,875	40	99.2	......	‡ 1.01
" 29, "	30	128,000,000	1,575	58	96.3	......	0.59
" 30, "	30	128,000,000	1,400	198	85.9	94.9 (96.3)	0.58

* The count on Oct. 6 was made by Professor H. C. Ernst.
† One-half "Free Flow."
‡ One-half grain when samples were taken.
‖ Temperature of Applied Water 71°.

TABLE NO. 8.

FILTRATION EXPERIMENTS.—MORISON MECHANICAL FILTER.

Growths of Water Bacteria of EIGHTY FIVE HOURS OR MORE AND END GROWTHS, in all of the Samples of Filtered Water that were taken THIRTY MINUTES OR LESS after water commenced to flow from the filter.

Date.	Minutes after Flow.	Gallons of Water Filtered per Acre, per 24 Hours.	Bacteria per Cubic Centimeter.		Per cent. of the Applied Bacteria Removed.	Average Percentage of the Applied Bacteria Removed.	Grains of Sulphate of Alumina used per Gallon.
			In Applied Water.	In Filtered Water.			
Oct. *6, 1893	20	131,000,000	7,795	60	99.2	99.2	0.60
Oct. 17, "	21	110,000,000	6,175+	82	98.7	......	† 0.57
" 25, "	16	100,000,000	33,500	250	99.3	......	0.62
" 26, "	17	101,000,000	17,300	248	98.6	......	0.60
" 27, "	18	116,000,000	10,700	431	96.0	......	0.61
" 28, "	19	106,000,000	7,200	268	96.3	......	0.81
" 30, "	18	106,000,000	1,700	66	96.1	......	0.56
Nov. 2, "	16	116,000,000	7,900	134	98.3	......	0.81
" 3, "	22	116,000,000	11,450	113	99.0	......	0.84
" 4, "	18	102,000,000	4,100	344	91.6	......	‡ 1.20
" 4, "	23	112,000,000	4,100	220	94.6	......	‡ 1.20
" 6, "	21	112,000,000	2,300	26	98.9	......	0.60
" 9, "	18	100,000,000	2,600	135	94.8	......	0.85
" 9, "	23	108,000,000	2,600	214	91.8	......	0.85
" 11, "	15	104,000,000	3,650	252	93.1	......	0.82
" 15, "	18	95,000,000	3,800	?	93.4	......	0.88

Nov. 17, 1893	21	108,000,000	2,960	380	87.2	......	0.85
" 18, "	21	120,000,000	2,025	113	94.4	......	0.61
" 20, "	21	109,000,000	1,290	350	72.9	94.2 (96.9)	0.60
		Commenced to use Bacillus Prodigiosus.					
Nov. 23, 1893	21	99,000,000	15,850	536	96.6	......	0.60
" 24, "	30	132,000,000	14,000	1,103	92.1	......	0.59
Dec. 1, "	30	128,000,000	2,850	420	85.3	......	0.97
" 2, "	30	112,000,000	6,000	270	95.5	......	0.74
" 4, "	30	119,000,000	4,475	278	93.8	......	0.60
" 5, "	30	110,000,000	5,800	198	96.6	......	0.61
" 7, "	30	98,000,000	4,000	91	97.7	......	0.60
" 12, "	30	121,000,000	3,200	112	96.5	......	0.58
" 13, "	30	132,000,000	3,300	144	95.6	......	0.60
" 14, "	30	134,000,000	4,950	244	95.1	......	0.59
" 15, "	30	132,000,000	1,900	104	94.5	......	0.66
" 16, "	30	132,000,000	5,900	224	96.2	......	0.71
" 19, "	30	136,000,000	5,350	404	92.4	......	0.58
" 21, "	30	142,000,000	3,200	160	95.0	......	0.61
" 23, "	30	132,000,000	2,600	127	95.1	......	0.72
" 26, "	30	137,000,000	4,367	208	95.2	......	0.82
" 28, "	30	130,000,000	2,700	248	90.8	......	0.85
" 29, "	30	123,000,000	2,275	170	92.5	......	0.81
Jan. 1, 1894	30	128,000,000	2,533	708	72.0	......	0.82
" 2, "	30	128,000,000	2,850	358	87.4	......	0.85
" 3, "	30	136,000,000	3,375	304	91.0	......	0.84
" 4, "	30	148,000,000	5,025	202	96.0	......	0.85
" 5, "	30	134,000,000	3,775	226	94.0	......	0.82
" ‖ 6, "	30	136,000,000	2,700	256	90.5	......	1.00
" ‖ 8, "	30	137,000,000	4,000	430	89.3	92.7 (92.7)	0.58
		Ceased to use Bacillus Prodigiosus.					

TABLE No. 8.—CONCLUDED.

Date.	Minutes after Flow.	Gallons of Water Filtered per Acre, per 24 Hours.	Bacteria per Cubic Centimeter.		Per cent. of the Applied Bacteria Removed.	Average Percentage of the Applied Bacteria Removed.	Grains of Sulphate of Alumina used per Gallon.
			In Applied Water.	In Filtered Water.			
Jan. 9, 1894	30	132,000,000	3,400	156	95.4	......	0.60
" 10, "	30	128,000,000	1,725	132	92.3	......	0.84
" 11, "	30	121,000,000	2,150	100	95.3	......	0.61
" 12, "	30	134,000,000	875	94	89.3	......	0.81
" 13, "	30	128,000,000	1,633	106	93.5	......	0.72
" 15, "	30	134,000,000	1,600	116	92.8	......	0.84
" 16, "	30	134,000,000	775	296	61.8	......	0.58
" 17, "	30	113,000,000	3,375	350	89.6	......	0.82
" 18, "	30	121,000,000	3,800	234	93.8	......	0.59
" 19, "	30	132,000,000	2,767	192	93.1	......	0.83
" 20, "	30	125,000,000	5,200	208	96.0	......	0.72
" 22, "	30	134,000,000	11,200	682	93.9	......	0.85
" 23, "	30	128,000,000	4,133	514	87.6	90.3 (92.5)	0.80
			Washed filter-bed with Caustic Soda.				
Jan. 24, 1894	30	128,000,000	5,025	166	96.7	......	0.60
" 25, "	30	128,000,000	3,600	144	96.0	......	0.82
" 26, "	30	128,000,000	10,700	286	97.3	......	0.58
" 27, "	30	132,000,000	7,567	77	99.0	......	‡ 1.01
" 29, "	30	128,000,000	3,100	76	97.5	......	0.59
" 30, "	30	128,000,000	3,000	312	89.6	96.0 (96.8)	0.58

* The count on Oct. 6 was made by Professor H. C. Ernst.
† One-half "Free Flow."
‡ One-half grain when samples were taken.
‖ Temperature of Applied Water 71°.

TABLE NO. 9.

SUMMARY of the Average Percentages, of Applied Water Bacteria, that were REMOVED by the Experimental Morison Mechanical Filter. Determined from Samples of Filtered Water that were taken ONE HOUR OR MORE after water commenced to flow from the filter. (See tables 2, 3, 4 and 5).

REMARKS.	Samples that were taken the Same Hour as the Applied Water.		Samples that were taken One Hour or More after water commenced to flow from the filter.	
	End Growths.	Growths of about 90 Hours.	End Growths.	Growths of 85 Hours or More and End Growths.
Professor Ernst's counts.	Total number 5.	Total number 5.	Total number 5.	Total number 5.
July and Oct. 1893	99.5 (99.6)	99.5 (99.6)	99.5 (99.6)	99.5 (99.6)
	Total number 10.	Total number 10.	Total number 12.	Total number 16.
Oct. 17 to Nov. 11 and 18, 1893	99.0 (99.4)	99.2 (99.5)	98.6 (98.8)	98.8 (99.1)
	Total number 9.	Total number 9.	Total number 35.	Total number 128.
Nov. 23, 1893, to Jan. 8 and 9, 1894. Bacillus Prodigiosus used.	95.9 (96.8)	96.1 (96.9)	96.1 (96.9)	95.9 (96.8)

11

TABLE NO. 9.—CONCLUDED.

REMARKS.	Samples that were taken the Same Hour as the Applied Water.		Samples that were taken One Hour or More after water commenced to flow from the filter.	
	End Growths.	Growths of about 90 Hours.	End Growths.	Growths of 85 Hours or More and End Growths.
	Total number 13.	Total number 13.	Total number 58.	Total number 58.
Jan. 9 to Jan. 23, 1894....	91.2 (94.3)	94.6 (96.3)	92.8 (95.2)	92.8 (95.2)
	Total number 6.	Total number 6.	Total number 18.	Total number 18.
Jan. 24 to Jan. 30, 1894.................... After washing with Caustic Soda.	98.3 (98.5)	98.2 (98.5)	98.8 (98.9)	98.8 (98.9)
	Total number 38.	Total number 38.	Total number 123.	Total number 220.
Average of All the Above from Oct. 17 to Jan. 30.............................	95.5 (97.5)	96.7 (98.1)	95.2 (97.0)	95.5 (97.0)
	Total number 16.	Total number 16.	Total number 30.	Total number 34.
Average from Oct. 17 to Nov. 11 and 18, 1893, and from Jan. 24 to Jan. 30, 1894.......	98.7 (99.1)	98.8 (99.3)	98.7 (98.9)	98.8 (99.0)

TABLE NO. 10.

SUMMARY of the Average Percentages, of Applied Water Bacteria, that were REMOVED by the Experimental Morison Mechanical Filter. Determined from Samples of Filtered Water that were taken THIRTY MINUTES OR LESS after water commenced to flow from the filter. (See tables 6, 7 and 8).

REMARKS.	End Growths.	Growths of about 90 Hours.	Growths of 85 Hours or More and End Growths.
Professor Ernst's counts.	Total number 1.	Total number 1.	Total number 1.
Oct. 1893	99.2	99.2	99.2
	Total number 7.	Total number 8.	Total number 18.
Oct. 17 to Nov. 11 and 20, 1893	96.1 (96.9)	96.4 (97.4)	94.2 (96.9)
	Total number 13.	Total number 13.	Total number 25.
Nov. 23, 1893, to Jan. 8, 1894 Bacillus Prodigiosus used.	90.9 (92.7)	90.7 (92.5)	92.7 (92.7)

TABLE No. 10.—CONCLUDED.

REMARKS.	End Growths.	Growths of about 90 Hours.	Growths of 85 Hours or More and End Growths.
	Total number 13.	Total number 13.	Total number 13.
Jan. 9 to Jan. 23, 1894	90.3 (92.5)	93.0 (95.1)	90.3 (92.5)
	Total number 6.	Total number 6.	Total number 6.
Jan. 24 to Jan. 30, 1894 After washing with Caustic Soda.	96.0 (96.8)	94.9 (96.3)	96.0 (96.8)
	Total number 39.	Total number 39.	Total number 62.
Average of All the Above from Oct. 17 to Jan. 30	92.4 (94.4)	93.1 (94.9)	92.9 (95.1)
	Total number 13.	Total number 13.	Total number 24.
Average from Oct. 17 to Nov. 11 and 20, 1893, and from Jan. 24 to Jan. 30, 1894	96.1 (96.8)	95.7 (97.1)	94.6 (96.9)

TABLE No. 11.

Showing the number of times that Percentages of MORE THAN TWO PER CENT., of the Applied Water Bacteria, APPEARED in the Filtered Water of the Morison Mechanical Filter. Determined from Samples of Filtered Water that were taken ONE HOUR OR MORE after water commenced to flow from the filter. Also the Percentages that the number of times are of the Total Number of Results obtained. (See tables 2, 3, 4 and 5).

PER CENTS.	From Oct. 17 to Nov. 11 and 18, 1893, and from Jan. 24 to Jan. 30, 1894.							
	Samples taken the Same Hour as the Samples of Applied Water.				Samples taken One Hour or More after water commenced to flow from the filter.			
	End Growths.		Growths of about 90 Hours.		End Growths.		Growths of 85 Hours or More and End Growths.	
	Total number 16.		Total number 16.		Total number 30.		Total number 34.	
	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.
3	2	12.5	....	....	2	6.7	2	5.9
4	1	6.3	....	....	2	6.7	2	5.9
5	....	....	1	6.3	....	....	....	....
Totals........	3	18.8	1	6.3	4	13.4	4	11.8

TABLE NO. 12.

Showing the number of times that Percentages of the Applied Water Bacteria REMOVED (by the Morison Mechanical Filter), were ONE PER CENT. AND MORE LESS THAN THE AVERAGE PER CENT. REMOVED. Determined from Samples of Filtered Water that were taken ONE HOUR OR MORE after water commenced to flow from the filter. Also the Percentages that the number of times are of the Total Number of Results obtained. (See tables 2, 3, 4 and 5).

PER CENTS LESS THAN THE AVERAGE.	From Oct. 17 to Nov. 11 and 18, 1893, and from Jan. 24 to Jan. 30, 1894.							
	Samples taken the Same Hour as the Samples of Applied Water.				Samples taken One Hour or More after water commenced to flow from the filter.			
	End Growths. Average 98.7.		Growths of about 90 Hours. Average 98.8.		End Growths. Average 98.7.		Growths of 85 Hours or More and End Growths. Average 98.8.	
	Total number 16.		Total number 16.		Total number 30.		Total number 34.	
	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.
1	2	12.5	1	6.3	2	6.7	2	5.9
2	1	6.3	....	....	1	3.3	1	2.9
3	1	6.3	....	....	2	6.7	2	5.9
4	....	....	1	6.3	....	....	....	....
Totals........	4	25.1	2	12.6	5	16.7	5	14.7

TABLE NO. 13.

Showing the number of times that Percentages of the Applied Water Bacteria REMOVED *(by the Morison Mechanical Filter), were* MORE THAN TWO PER CENT. LESS THAN THE AVERAGE PER CENT. REMOVED. *Determined from Samples of Filtered Water that were taken* ONE HOUR OR MORE *after water commenced to flow from the filter. Also the Percentages that the number of times are of the Total Number of Results obtained. (See tables 2, 3, 4 and 5).*

PER CENTS LESS THAN THE AVERAGE.	From Oct. 17 to Nov. 11 and 18, 1893, and from Jan. 24 to Jan. 30, 1894.							
	Samples taken the Same Hour as the Samples of Applied Water.				Samples taken One Hour or More after water commenced to flow from the filter.			
	End Growths. Average 98.7.		Growths of about 90 Hours. Average 98.8.		End Growths. Average 98.7.		Growths of 85 Hours or More and End Growths. Average 98.8.	
	Total number 16.		Total number 16.		Total number 30.		Total number 31.	
	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.
3	1	6.3	....	....	2	6.7	2	5.9
4	....	....	1	6.3	....	...	....	....
Totals........	1	6.3	1	6.3	2	6.7	2	5.9

Table No. 14.

Showing the number of times that Percentages of the Applied Water Bacteria REMOVED (by the Morison Mechanical Filter), were ONE PER CENT. AND MORE LESS THAN THE AVERAGE PER CENT. REMOVED. Determined from Samples of Filtered Water that were taken ONE HOUR OR MORE after water commenced to flow from the filter. Also the Percentages that the number of times are of the Total Number of Results obtained. (See tables 2, 3, 4 and 5).

Per Cents Less than the Average.	From Nov. 23, 1893, to Jan. 8 and 9, 1894. (Bacillus Prodigiosus used).							
	Samples taken the Same Hour as the Samples of Applied Water.				Samples taken One Hour or More after water commenced to flow from the filter.			
	End Growths. Average 95.9.		Growths of about 90 Hours. Average 96.1.		End Growths. Average 96.1.		Growths of 85 Hours or More and End Growths. Average 95.9.	
	Total number 9.		Total number 9.		Total number 35.		Total number 128.	
	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.
1	....	....	....	....	1	2.9	3	2.3
2	2	22.2	1	11.1	3	8.6	6	4.7
3	....	....	....	....	1	2.9	4	3.1
4	....	....	1	11.1	....	....	1	0.8
5	1	11.1	....	....	2	5.7	2	1.6
6	....	....	....	....	1	2.9	3	2.3
8	....	....	....	....	....	....	2	1.6
9	....	....	....	....	1	2.9	1	0.8
10	....	....	....	....	....	....	1	0.8
15	...	....	....	....	....	....	1	0.8
19	....	....	....	....	....	....	1	0.8
26	....	....	....	....	....	....	1	0.8
Totals........	3	33.3	2	22.2	9	25.9	26	20.4

TABLE NO. 14.—CONCLUDED.

PER CENTS LESS THAN THE AVERAGE.	From Jan. 9 to Jan. 23, 1894.							
	Samples taken the Same Hour as the Samples of Applied Water.				Samples taken One Hour or More after water commenced to flow from the filter.			
	End Growths. Average 91.2.		Growths of about 90 Hours. Average 94.6.		End Growths. Average 92.8.		Growths of 85 Hours or More and End Growths. Average 92.8.	
	Total number 13.		Total number 13.		Total number 58.		Total number 58.	
	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.
1	....	....	....	....	....	....	....	....
2	....	....	....	....	....	....	....	....
3	1	7.7	....	....	1	1.7	1	1.7
4	....	....	1	7.7	2	3.4	2	3.4
6	....	....	1	7.7	....	....	....	....
7	....	....	....	....	....	....	....	....
8	....	....	....	....	1	1.7	1	1.7
9	...	....	....	....	1	1.7	1	1.7
10	....	....	1	7.7	1	1.7	1	1.7
11	....	....	....	....	2	3.4	2	3.4
12	....	....	....	....	1	1.7	1	1.7
13	....	....	....	....	1	1.7	1	1.7
14	1	7.7	....	....	1	1.7	1	1.7
16	....	....	....	....	1	1.7	1	1.7
23	1	7.7	....	....	....	....	....	....
24	....	....	....	....	1	1.7	1	1.7
Totals........	3	23.1	3	23.1	13	22.1	13	22.1

TABLE No. 15.

Showing the number of times that Percentages of MORE THAN TWO PER CENT., of the Applied Water Bacteria, APPEARED in the Filtered Water of the Morison Mechanical Filter. Determined from Samples of Filtered Water that were taken THIRTY MINUTES OR LESS after water commenced to flow from the filter. Also the Percentages that the number of times are of the Total Number of Results obtained. (See tables 6, 7 and 8).

PER CENTS.	From Oct. 17 to Nov. 11 and 20, 1893, and from Jan. 24 to Jan. 30, 1894.					
	End Growths.		Growths of about 90 Hours.		Growths of 85 Hours or More and End Growths.	
	Total number 13.		Total number 13.		Total number 24.	
	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.
3	3	23.1	2	15.4	3	12.5
4	3	23.1	2	15.4	4	16.7
5	....	....	2	15.4	2	8.3
6	....	....	1	7.7	1	4.2
7	1	7.7	1	7.7	2	8.3
8	1	7.7	....	....	2	8.3
10	1	7.7	....	....	1	4.2
13	....	....	....	....	1	4.2
14	....	....	1	7.7	....	....
27	....	....	....	....	1	4.2
Totals	9	69.3	9	69.3	17	70.9

Table No. 16.

Showing the number of times that Percentages of the Applied Water Bacteria Removed *(by the Morison Mechanical Filter), were* One Per Cent. and More Less than the Average Per Cent. Removed. *Determined from Samples of Filtered Water that were taken* Thirty Minutes or Less *after water commenced to flow from the filter. Also the Percentages that the number of times are of the Total Number of Results obtained. (See tables 6, 7 and 8).*

Per Cents Less than the Average.	From Oct. 17 to Nov. 11 and 20, 1893, and from Jan. 21 to Jan. 30, 1894.					
	End Growths. Average 96.1.		Growths of about 90 Hours. Average 95.7.		Growths of 85 Hours or More and End Growths. Average 94.6.	
	Total number 13.		Total number 13.		Total number 24.	
	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.
1	....	....	1	7.7	1	4.2
2	....	....	1	7.7	1	4.2
3	1	7.7	1	7.7	2	8.3
5	1	7.7	....	....	1	4.2
7	1	7.7	....	....	1	4.2
10	....	....	1	7.7	....	....
22	....	....	....	....	1	4.2
Totals	3	23.1	4	30.8	7	29.3

Table No. 17.

Showing the number of times that Percentages of the Applied Water Bacteria REMOVED *(by the Morison Mechanical Filter), were* MORE THAN TWO PER CENT. LESS THAN THE AVERAGE PER CENT. REMOVED. *Determined from Samples of Filtered Water that were taken* THIRTY MINUTES OR LESS *after water commenced to flow from the filter. Also the Percentages that the number of times are of the Total Number of Results obtained. (See tables 6, 7 and 8).*

Per Cents Less than the Average.	From Oct. 17 to Nov. 11 and 20, 1893, and from Jan. 24 to Jan. 30, 1894.					
	End Growths. Average 96.1.		Growths of about 90 Hours. Average 95.7.		Growths of 85 Hours or More and End Growths. Average 94.6.	
	Total number 13.		Total number 13.		Total number 24.	
	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.
3	1	7.7	1	7.7	2	8.3
5	1	7.7	....	....	1	4.2
7	1	7.7	....	....	1	4.2
10	....	....	1	7.7	....	....
22	....	....	....	....	1	4.2
Totals	3	23.1	2	15.4	5	20.9

TABLE NO. 18.

Showing the number of times that Percentages of the Applied Water Bacteria REMOVED (by the Morison Mechanical Filter), were ONE PER CENT. AND MORE LESS THAN THE AVERAGE PER CENT. REMOVED. Determined from Samples of Filtered Water that were taken THIRTY MINUTES OR LESS after water commenced to flow from the filter. Also the Percentages that the number of times are of the Total Number of Results obtained. (See tables 6, 7 and 8).

PER CENTS LESS THAN THE AVERAGE.	From Nov. 23, 1893, to Jan. 8, 1894. (Bacillus Prodigiosus used).					
	End Growths. Average 90.9.		Growths of about 90 Hours. Average 90.7.		Growths of 85 Hours or More and End Growths. Average 92.7.	
	Total number 13.		Total number 13.		Total number 25.	
	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.
1	....	....	....	....	....	....
2	1	7.7	2	15.4	3	12.0
3	....	....	....	....	1	4.0
4	1	7.7	....	....	....	....
5	....	....	1	7.7	1	4.0
6	1	7.7	....	....	....	....
7	....	....	....	....	1	4.0
8	....	....	1	7.7	....	....
17	....	....	1	7.7	....	....
19	1	7.7	....	....	....	....
21	....	....	....	....	1	4.0
Totals	4	30.8	5	38.5	7	28.0

TABLE No. 18.—CONCLUDED.

Per Cents Less than the Average.	From Jan. 9 to Jan. 23, 1894.					
	End Growths. Average 90.3.		Growths of about 90 Hours. Average 93.0.		Growths of 85 Hours or More and End Growths. Average 90.3.	
	Total number 13.		Total number 13.		Total number 13.	
	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.
1	1	7.7	....	....	1	7.7
2	....	....	1	7.7	....	....
3	1	7.7	1	7.7	1	7.7
7	....	....	1	7.7	....	....
8	....	....	1	7.7	....	....
29	1	7.7	....	....	1	7.7
Totals	3	23.1	4	30.8	3	23.1

TABLE NO. 19.

FILTRATION EXPERIMENTS.—MORISON MECHANICAL FILTER.

Table showing the Percentage of Applied BACILLUS PRODIGIOSUS that was REMOVED from the water by filtration. Also the number of these Bacilli that were found in the Applied and Filtered Water and the length of time that they were Grown.

DATE.	Hour that Sample was taken.	Gallons of Water Filtered per Acre, per 24 Hours.	Bacillus Prodigiosus per Cubic Centimeter in Applied Water.			Bacillus Prodigiosus per Cubic Centimeter in Filtered Water.				
						End of Growth.		Last Growth obtained.		Per cent. of the Applied Bacilli Removed.
			Estimated by Flow.	From top of Filter.	Hours of Growth.	Number of Bacilli.	Hours of Growth.	Number of Bacilli.	Hours of Growth.	
Nov. 23, 1893.	9.00 A.M.	116,000,000	....	....	....	....	....	5	140	100.0
	10.00 A.M.	116,000,000	....	....	....	....	....	12	140	99.9
	11.00 A.M.	120,000,000	....	....	....	....	....	6	92	100.0
	12 M.	120,000,000	12,173	....	45	30	116	....	....	99.8
	1.00 P.M.	125,000,000	....	....	....	...	....	4	116	100.0
	2.00 P.M.	128,000,000	...	....	....	....	....	0	....	100.0
	3.00 P.M.	132,000,000	....	....	....	....	....	0	....	100.0
	3.40 P.M.	132,000,000	....	....	....	....	...	3	113	100.0
Nov. 24, 1893.	5.43 A.M.	128,000,000	....	....	....	....	....	13	117	99.9
Nov. 24, 1893.	8.42* A.M.	132,000,000	...	....	....	....	....	1	117	100.0
	9.00 A.M.	146,000,000	....	....	....	....	...	2	67	100.0
	10.00 A.M.	146,000,000	....	....	....	....	....	L	....	....
	11.00 A.M.	132,000,000	...	....	....	3	67	...	....	100.0
	12 M.	132,000,000	....	10,000,000	93	....	....	6	....	100.0

TABLE NO. 19.—CONTINUED.

DATE.	Hour that Sample was taken.	Gallons of Water Filtered per Acre, per 24 Hours.	Bacillus Prodigiosus per Cubic Centimeter in Applied Water.			Bacillus Prodigiosus per Cubic Centimeter in Filtered Water.				
						End of Growth.		Last Growth obtained.		Per cent. of the Applied Bacilli Removed.
			Estimated by Flow.	From top of Filter.	Hours of Growth.	Number of Bacilli.	Hours of Growth.	Number of Bacilli.	Hours of Growth.	
Nov. 24, 1893.	1.00 P.M.	128,000,000	....	....	....	3	93	....	....	100.0
	2.00 P.M.	121,000,000	....	....	....	....	....	4	115	100.0
	3.00 P.M.	121,000,000	....	....	....	....	....	3	91	100.0
	3.40 P.M.	132,000,000	....	....	....	....	....	2	91	100.0
Nov. 25, 1893.	4.56 A.M.	128,000,000	....	....	....	....	....	791	....	100.0
Nov. 25, 1893.	9.00 A.M.	128,000,000	....	....	....	....	....	2	142	100.0
	10.00 A.M.	125,000,000	...	....	....	....	....	6	142	100.0
	11.00 A.M.	128,000,000	....	....	....	....	....	0	142	100.0
	12 M.	132,000,000	....	1,500,000	92	....	....	0	142	100.0
	2.00 P.M.	123,000,000	....	....	....	....	....	L	....	....
	3.00 P.M.	137,000,000	....	....	....	....	....	L	....	....
	3.40 P.M.	132,000,000	....	....	....	....	....	L	....	....
Nov. 28, 1893.	9.30 A.M.	128,000,000	....	....	....	....	....	0	93	100.0
	10.30 A.M.	132,000,000	....	....	....	....	....	0	93	100.0
	11.30 A.M.	132,000,000	....	....	....	....	....	0	93	100.0
	12.30 P.M.	128,000,000	....	5,010	93	....	....	0	93	100.0
	1.30 P.M.	125,000,000	....	....	....	....	....	0	67	100.0
	2.30 P.M.	128,000,000	....	....	....	....	....	0	67	100.0
	3.30 P.M.	125,000,000	....	....	....	....	....	L	....	....
Nov. 29, 1893.	4.45 A.M.	125,000,000	....	....	....	....	....	0	97	100.0

Dec. 1, 1893.	9.30 A.M.	136,000,000	....	....	....	8	166	....	....	99.9
	10.30 A.M.	140,000,000	....	....	....	6	142	....	....	100.0
	11.30 A.M.	136,000,000	....	....	....	....	....	29	190	99.8
	12.30 P.M.	132,000,000	11,900	....	190	....	....	2	142	100.0
	1.30 P.M.	128,000,000	....	....	....	....	....	6	190	100.0
	2.30 P.M.	134,000,000	....	....	....	....	....	2	190	100.0
	3.40 P.M.	132,000,000	....	....	....	2	190	....	....	100.0
Dec. 2, 1893.	9.30 A.M.	128,000,000	....	....	....	....	....	0	137	100.0
	10.30 A.M.	125,000,000	....	....	....	....	....	0	185	100.0
	11.30 A.M.	125,000,000	....	....	....	....	...	0	185	100.0
	12.30 P.M.	128,000,000	....	52	164	....	....	0	185	100.0
	1.30 P.M.	125,000,000	....	....	....	....	....	0	185	100.0
	2.30 P.M.	125,000,000	....	....	....	....	....	0	185	100.0
	3.40 P.M.	125,000,000	....	....	....	....	....	0	185	100.0
Dec. 5, 1893.	9.30 A.M.	123,000,000	....	....	....	1	119	....	....	100.0
	10.30 A.M.	125,000,000	....	....	....	....	....	2	95	100.0
	11.30 A.M.	128,000,000	....	....	....	....	....	0	142	100.0
	12 M.	128,000,000	....	6,365	....	....	....	....	....	....
	12.30 P.M.	128,000,000	....	....	....	1	95	....	....	100.0
	1.30 P.M.	128,000,000	....	....	....	1	90	....	....	100.0
	2.30 P.M.	125,000,000	....	....	....	....	....	1	90	100.0
	3.40 P.M.	125,000,000	....	....	....	....	....	1	114	100.0
Dec. 6, 1893.	9.30 A.M.	134,000,000	....	....	....	3	95	....	....	100.0
	10.30 A.M.	128,000,000	....	....	....	1	95	....	....	100.0
	11.30 A.M.	125,000,000	....	....	....	3	119	....	....	100.0
	12.30 P.M.	125,000,000	....	12,000	119	....	....	3	133	100.0
	1.30 P.M.	125,000,000	....	....	....	....	....	0	139	100.0

TABLE NO. 19.—CONTINUED.

Date.	Hour that Sample was taken.	Gallons of Water Filtered per Acre, per 24 Hours.	Bacillus Prodigiosus per Cubic Centimeter in Applied Water.			Bacillus Prodigiosus per Cubic Centimeter in Filtered Water.				
						End of Growth.		Last Growth obtained.		Per cent. of the Applied Bacilli Removed.
			Estimated by Flow.	From top of Filter.	Hours of Growth.	Number of Bacilli.	Hours of Growth.	Number of Bacilli.	Hours of Growth.	
Dec. 6, 1893.	2.30 P.M.	128,000,000	....	....	....	....	....	2	115	100.0
	3.40 P.M.	125,000,000	....	....	....	....	....	3	115	100.0
Dec. 12, 1893.	9.30 A.M.	128,000,000	....	...	....	....	....	0	90	100.0
	10.30 A.M.	125,000,000	....	....	....	....	....	0	116	100.0
	11.30 A.M.	128,000,000	....	....	....	....	....	0	90	100.0
	12.30 P.M.	128,000,000	....	1,000	116	....	....	2	116	100.0
	1.30 P.M.	125,000,000	....	....	....	....	....	0	90	100.0
	2.30 P.M.	131,000,000	....	....	....	....	....	0	90	100.0
	3.40 P.M.	128,000,000	....	....	....	....	....	0	116	100.0
Dec. 13, 1893.	9.30 A.M.	134,000,000	....	....	....	....	....	0	92	100.0
	10.30 A.M.	134,000,000	....	....	....	....	....	0	92	100.0
	11.30 A.M.	137,000,000	....	....	....	....	....	0	92	100.0
	12.30 P.M.	134,000,000	....	1,200	92	....	....	0	113	100.0
	1.30 P.M.	134,000,000	....	....	....	....	....	0	111	100.0
	2.30 P.M.	130,000,000	....	....	....	....	....	0	111	100.0
	3.40 P.M.	132,000,000	....	....	....	....	....	0	92	100.0
Dec. 14, 1893.	9.30 A.M.	136,000,000	....	....	....	....	....	0	113	100.0
	10.30 A.M.	137,000,000	....	....	....	....	....	0	113	100.0
	11.30 A.M.	136,000,000	....	....	....	....	....	0	113	100.0

Dec. 14, 1893.	12.30 P.M.	134,000,000	....	1,200	113	....	....	0	113	100.0
	1.30 P.M.	134,000,000	...	....	....	....	....	0	113	100.0
	2.30 P.M.	134,000,000	....	....	....	....	....	0	113	100.0
	3.40 P.M.	132,000,000	....	....	....	....	....	0	137	100.0
Dec. 15, 1893.	9.30 A.M.	137,000,000	....	....	....	....	....	0	137	100.0
	10.30 A.M.	132,000,000	....	....	....	1	89	....	....	100.0
	11.30 A.M.	132,000,000	....	....	....	2	89	....	....	100.0
	12.30 P.M.	134,000,000	....	5,000	113	1	113	....	....	100.0
	1.30 P.M.	130,000,000	....	....	....	1	113	....	....	100.0
	2.30 P.M.	128,000,000	....	....	....	....	....	0	137	100.0
	3.40 P.M.	132,000,000	....	....	....	....	....	0	137	100.0
Dec. 16, 1893.	4.35 A.M.	130,000,000	....	....	....	....	....	0	137	100.0
Dec. 16, 1893.	9.23 A.M.	132,000,000	....	....	....	....	....	0	137	100.0
	10.00 A.M.	132,000,000	....	....	....	....	....	12	89	99.7
	11.00 A.M.	132,000,000	....	....	....	....	....	0	89	100.0
	12 M.	134,000,000	....	4,000	137	....	....	22	137	99.5
	1.00 P.M.	132,000,000	....	....	....	....	...	6	113	99.9
	2.00 P.M.	131,000,000	....	....	....	3	111	....	....	99.9
	3.00 P.M.	134,000,000	....	....	....	1	111	....	....	100.0
	3.40 P.M.	131,000,000	....	...	....	1	87	....	....	100.0
Dec. 18, 1893.	9.30 A.M.	131,000,000	....	....	....	....	....	0	65	100.0
	10.30 A.M.	132,000,000	....	....	....	....	....	0	65	100.0
	11.30 A.M.	132,000,000	....	....	....	....	....	0	65	100.0
	12.30 P.M.	131,000,000	....	8,500	65	....	....	0	65	100.0
	1.30 P.M.	128,000,000	....	....	....	....	....	0	63	100.0
	2.30 P.M.	131,000,000	....	....	....	....	....	0	63	100.0
	3.40 P.M.	128,000,000	....	....	....	....	....	0	63	100.0

TABLE NO. 19.—CONTINUED.

DATE.	Hour that Sample was taken.	Gallons of Water Filtered per Acre, per 24 Hours.	Bacillus Prodigiosus per Cubic Centimeter in Applied Water.			Bacillus Prodigiosus per Cubic Centimeter in Filtered Water.				
						End of Growth.		Last Growth obtained.		Per cent. of the Applied Bacilli Removed.
			Estimated by Flow.	From top of Filter.	Hours of Growth.	Number of Bacilli.	Hours of Growth.	Number of Bacilli.	Hours of Growth.	
Dec. 19, 1893.	4.40 A.M.	128,000,000	....	....	....	....	....	0	63	100.0
Dec. 19, 1893.	9.30 A.M.	147,000,000	....	....	....	....	....	0	65	100.0
	10.30 A.M.	147,000,000	....	....	....	....	....	0	89	100.0
	11.30 A.M.	147,000,000	....	....	....	1	89	....	....	100.0
	12.30 P.M.	134,000,000	....	10,500	65	....	....	0	41	100.0
	1.30 P.M.	134,000,000	....	....	....	....	....	0	65	100.0
	2.30 P.M.	128,000,000	....	....	....	....	....	0	65	100.0
	3.40 P.M.	132,000,000	....	....	....	....	....	0	65	100.0
Dec. 20, 1893.	5.35 A.M.	132,000,000	....	....	....	....	....	0	65	100.0
Dec. 20, 1893.	9.30 A.M.	132,000,000	....	....	....	....	....	40	66	100.0
	10.30 A.M.	136,000,000	....	....	....	....	....	31	66	100.0
	11.30 A.M.	136,000,000	....	....	....	....	....	29	66	100.0
	12.30 P.M.	132,000,000	....	195,000	42	....	....	31	66	100.0
	1.30 P.M.	128,000,000	....	....	....	....	....	16	90	100.0
	2.30 P.M.	130,000,000	....	....	....	....	....	10	90	100.0
	3.40 P.M.	128,000,000	....	1,512,000	40	....	....	15	66	100.0
Dec. 21, 1893.	5.30 A.M.	132,000,000	....	....	....	....	....	5	90	100.0
Dec. 21, 1893.	9.30 A.M.	156,000,000	....	....	....	....	....	2	90	100.0
	10.30 A.M.	138,000,000	....	....	....	....	....	4	90	100.0

Dec. 21, 1893.	11.30 A.M.	132,000,000	....	....	....	....	....	0	90	100.0
	12.30 P.M.	132,000,000	....	81,000	42	....	....	1	114	100.0
	1.30 P.M.	130,000,000	....	....	....	....	....	0	114	100.0
	2.30 P.M.	128,000,000	....	....	....	....	....	1	90	100.0
	3.40 P.M.	121,000,000	....	....	....	....	....	1	90	100.0
Dec. 22, 1893.	9.30 A.M.	134,000,000	....	....	....	....	....	52	162	100.0
	10.30 A.M.	137,000,000	....	....	....	....	....	80	162	100.0
	11.30 A.M.	134,000,000	....	....	....	....	....	6	66	100.0
	12.30 P.M.	134,000,000	....	473,000	42	....	....	64	162	100.0
	1.30 P.M.	132,000,000	....	....	....	....	....	44	160	100.0
	2.30 P.M.	130,000,000	....	....	....	....	....	0	88	100.0
	3.40 P.M.	130,000,000	....	....	....	....	....	4	112	100.0
Dec. 23, 1893.	5.35 A.M.	128,000,000	....	....	....	....	....	0	137	100.0
	*									
Dec. 23, 1893.	8.23 A.M.	119,000,000	....	....	....	....	....	19	161	100.0
	*									
	8.38 A.M.	132,000,000	....	....	....	....	....	1	161	100.0
	9.30 A.M.	146,000,000	....	....	....	7	137	....	....	100.0
	10.30 A.M.	142,000,000	....	....	....	....	....	5	113	100.0
	11.30 A.M.	136,000,000	....	....	....	....	....	24	161	100.0
	12.30 P.M.	134,000,000	....	35,000	42	....	....	44	161	100.0
	1.30 P.M.	132,000,000	....	....	....	....	....	16	161	100.0
	2.30 P.M.	132,000,000	....	....	....	....	....	8	113	100.0
	3.30 P.M.	132,000,000	....	....	....	....	....	10	208	100.0
Dec. 26, 1893.	9.30 A.M.	137,000,000	....	....	....	....	....	74	88	100.0
	12.30 P.M.	128,000,000	....	186,000	41	....	....	136	88	99.9
	1.30 P.M.	128,000,000	....	....	....	....	....	28	135	100.0
	3.40 P.M.	130,000,000	....	....	....	....	....	144	86	99.9

TABLE NO. 19.—CONTINUED.

DATE.	Hour that Sample was taken.	Gallons of Water Filtered per Acre, per 24 Hours.	Bacillus Prodigiosus per Cubic Centimeter in Applied Water.			Bacillus Prodigiosus per Cubic Centimeter in Filtered Water.				
						End of Growth.		Last Growth obtained.		Per cent. of the Applied Bacilli Removed.
			Estimated by Flow.	From top of Filter.	Hours of Growth.	Number of Bacilli.	Hours of Growth.	Number of Bacilli.	Hours of Growth.	
Dec. 28, 1893.	9.30 A.M.	146,000,000	....	....	....	....	....	30	161	99.9
	12.30 P.M.	132,000,000	....	46,000	89	....	....	14	161	100.0
	1.30 P.M.	136,000,000	....	....	....	....	....	100	137	99.8
	3.40 P.M.	132,000,000	....	....	....	...	....	32	161	99.9
Dec. 29, 1893.	3.35 A.M.	130,000,000	....	....	....	....	....	32	114	99.9
Dec. 29, 1893.	9.30 A.M.	132,000,000	....	....	....	....	....	32,434	42	66.0
	12.30 P.M.	130,000,000	....	95,500	42	....	....	Great excess of Prodigiosus. All liquefied.		
	1.30 P.M.	132,000,000	....	....	....	....	. .			
	3.40 P.M.	130,000,000	....	....	....	....	....			
Jan. 1, 1894.	9.30 A.M.	132,000,000	....	....	....	....	....	176	112	99.8
	12.30 P.M.	130,000,000	....	86,000	64	....	....	458	112	99.5
	1.30 P.M.	132,000,000	....	....	....	....	....	218	112	99.7
	3.40 P.M.	130,000,000	...	....	....	....	....	442	112	99.5
Jan. 2, 1894.	3.35 A.M.	128,000,000	....	....	....	....	....	582	112	99.3
Jan. 2, 1894.	9.30 A.M.	147,000,000	....	....	....	....	....	26	113	100.0
	12.30 P.M.	132,000,000	....	68,000	41	....	....	2	137	100.0
	1.30 P.M.	132,000,000	....	....	....	....	....	174	89	100.0
	3.40 P.M.	130,000,000	....	....	....	....	....	2	137	100.0

Jan. 3, 1894.	9.30 A.M.	142,000,000	....	....	....	....	....	14	90	100.0
	12.30 P.M.	137,000,000	....	50,000	66	....	....	0	162	100.0
	1.30 P.M.	137,000,000	....	....	....	....	....	0	162	100.0
	3.40 P.M.	136,000,000	....	....	....	....	....	0	162	100.0
Jan. 4, 1894.	3.30 A.M.	128,000,000	....	....	....	....	....	34	161	99.9
	*									
Jan. 4, 1894.	8.27 A.M.	148,000,000	....	....	....	....	....	66	161	99.9
	9.30 A.M.	148,000,000	....	....	....	....	...	6	137	100.0
	12.30 P.M.	134,000,000	....	57,000	65	....	....	0	161	100.0
	1.30 P.M.	132,000,000	....	....	....	2	161	....	....	100.0
	3.40 P.M.	130,000,000	....	....	....	....	....	68	137	99.9
Jan. 5, 1894.	3.50 A.M.	130,000,000	....	....	....	2	161	....	....	100.0
Jan. 5, 1894.	9.30 A.M.	136,000,000	....	....	....	....	....	92	138	99.9
	12.30 P.M.	130,000,000	....	105,000	66	....	....	28	138	100.0
	1.30 P.M.	132,000,000	....	....	....	....	...	80	138	99.9
	3.40 P.M.	130,000,000	....	....	....	....	....	290	114	99.7
Jan. 6, 1894.	3.40 A.M.	125,000,000	....	....	....	....	....	30	113	100.0
Jan. †6, 1894.	12.30 P.M.	146,000,000	....	11,200	65	....	....	6	113	100.0
†	1.30 P.M.	138,000,000	....	....	....	....	....	4	87	100.0
†	3.40 P.M.	132,000,000	....	....	....	8	111	....	....	100.0
Jan. †8, 1894.	9.30 A.M.	142,000,000	....	....	....	....	....	0	138	100.0
†	12.30 P.M.	130,000,000	....	38,000	66	2	138	....	....	100.0
†	1.30 P.M.	128,000,000	....	....	....	....	....	0	138	100.0
†	3.40 P.M.	128,000,000	....	....	....	....	....	0	138	100.0

Average.. 99.8

(99.97)

Average not including 66 per cent. of Dec. 29.............................. 99.97

* Before Prodigiosus solution was turned on. † Temperature of Applied Water 71°. "L" in table signifies that sample liquefied.

TABLE NO. 19.—CONCLUDED.

Rates of Alumina added per gallon of Applied Water, not including "Free Flow," during the runs when Bacillus Prodigiosus was added to the Applied Water. (The quantity of "Free Flow" was always the same).

DATE.	Grains of Sulphate of Alumina used per Gallon, not including "Free Flow."	Remarks.	DATE.	Grains of Sulphate of Alumina used per Gallon, not including "Free Flow."	Remarks.
Nov. 23, 1893.	0.53	Throughout run.	Dec. 19, 1893.	0.51	Throughout run.
" 24, "	0.52	" "	" 20, "	0.53	" "
" 25, "	0.54	" "	" 21, "	0.54	" "
" 28, "	0.54	" "	" 22, "	0.51	" "
Dec. 1, "	0.50	From 9.30 A.M. to 11.30 A.M.	" 23, "	0.52	" "
" 1, "	1.00	" 12.30 P.M. to end of run.	" 26, "	0.74	" "
" 2, "	0.50	" 9.30 A.M. to 11.30 A.M.	" 28, "	0.77	" "
" 2, "	0.75	" 12.30 P.M. to end of run.	" 29, "	0.73	" "
" 5, "	0.53	Throughout run.	Jan. 1, 1894.	0.75	" "
" 6, "	0.52	" "	" 2, "	0.77	" "
" 12, "	0.51	" "	" 3, "	0.76	" "
" 13, "	0.53	" "	" 4, "	0.77	" "
" 14, "	0.52	" "	" 5, "	0.74	" "
" 15, "	0.59	" "	" 6,* "	0.76	" "
" 16, "	0.51	" "	" 8,* "	0.51	" "
" 18, "	0.52	" "			

"Free Flow" was not included in the above as the rates of Alumina added were sometimes changed during a run in order to ascertain if the efficiency of the filter would be improved or decreased.

* Temperature of Applied Water 71°.

Table No. 20.

Showing the Chemical Analyses, that were made at different times during the Filtration Experiments, of Samples of River and Applied Water and Filtered Water from the Morison Mechanical Filter, by Professor John H. Appleton of Brown University.

The larger figures signify parts (by weight) in one million parts of water, (by weight). The smaller figures signify grains per American gallon of water, (weighing 58,372.2 grains).

Remarks.	Total Residue.	Organic and Volatile Matter.	Mineral Matter.	Albuminoid Ammonia.	Ready-formed Ammonia.	Oxide of Iron. (Fe_2O_3).	Oxide of Aluminum. (Al_2O_3).	Alumina, etc. (Fe_2O_3).
June 7, 1893.								
River Water.........	37.60 2.195	13.40 .782	24.20 1.413	....	....	.74 .043	.57 .033	....
Filtered Water......	38.50 2.247	13.40 .782	25.10 1.465	....	....	.20 .012	.30 .017	....
July 25, 1893.								
Applied Water......	....	....	....	.30 .0175	.03 .0018	....	....	....
Filtered Water......	....	....	....	.08 .0047	.01 .0006	....	....	....
Aug. 15, 1893.								
River Water.........	....	....	....	.26	.02	....	....	....
*Filtered Water.....	92. 5.370	32. 1.868	60. 3.502	.08 .0047	0 0	....	....	....

TABLE No. 20.—CONTINUED.

The larger figures signify parts (by weight) in one million parts of water, (by weight). The smaller figures signify grains per American gallon of water, (weighing 58,372.2 grains).

REMARKS.	Total Residue.	Organic and Volatile Matter.	Mineral Matter.	Albuminoid Ammonia.	Ready-formed Ammonia.	Oxide of Iron. (Fe_2O_3).	Oxide of Aluminum. (Al_2O_3).	Alumina, etc. (Fe_2O_3).
Oct. 2, 1893.								
River Water.........	53.	17.	36.	.24	.06	....	....	....
	3.094	.992	2.101	.0140	.0035	....	....	....
†Filtered Water.....	60.	16.	44.	.08	0	....	....	....
	3.502	.934	2.569	.0046	0	....	....	....
Oct. 11, 1893.								
Applied Water......	60.	17.	43.	....	....	....	....	3.
Filtered Water—								
‡ 11.10 A.M.......	90.	17.	73.	....	....	....	....	10.
11.15 A.M.......	79.	18.	61.	....	....	....	....	6.
11.20 A.M.......	77.	17.	60.	....	....	....	....	3.5
11.25 A.M.......	67.	14.	53.	....	....	....	....	2.

* At end of run.
† 16 Minutes after water commenced to flow from the filter.
‡ 13 Minutes after water commenced to flow from the filter.
‖ 28 Minutes after water commenced to flow from the filter.

TABLE NO. 20.—CONCLUDED.

Sample of Pawtuxet River Water taken at Pettaconset Pumping Station, May 20, 1893, at 7 A.M.

	Parts by weight, per million of water, by weight.
Sand and insoluble in acid	2.81
Oxide of iron, Fe_2O_3	.65
Oxide of aluminum, Al_2O_3	.48
Lime, CaO	2.89
Magnesia, MgO	.68
Potash, K_2O	1.33
Soda, Na_2O	1.53
Sulphur trioxide, SO_3	1.83
Nitrogen pentoxide, N_2O_5	1.15
Carbon dioxide, CO_2, to form normal carbonate	2.36
Chlorine, Cl	2.52
	18.23
Subtract oxygen equivalent to chlorine found	.56
	17.67
Unaccounted for	.45
Amount found independently as total mineral matter	18.12

Carbon dioxide, expelled from water by boiling,—3.02.

The Above Results computed into the form of compounds.

	Parts by weight, per million of water, by weight.
Sand and insoluble in acid	2.81
Common salt, $NaCl$	2.89
Potassium sulphate, K_2SO_4	2.46
Calcium chloride, $CaCl_2$	1.20
Calcium sulphate, $CaSO_4$	1.19
Calcium nitrate, $Ca(NO_3)_2$	1.75
Calcium carbonate, $CaCO_3$	2.14
Magnesium carbonate, $MgCO_3$	1.43
Ferric oxide, Fe_2O_3	.65
Aluminic oxide, Al_2O_3	.48
Carbon dioxide, CO_2, combined, but in excess	.67
	17.67
Solid residue, unaccounted for	.45
Mineral residue, found by test	18.12

Carbon dioxide, expelled from water by boiling,—3.02.

Table No. 21.

Filtration Experiments.—Morison Mechanical Filter.

Color of the Water during each run of the filter. 0=Distilled Water. Range from 0 to 10.

Date.	Average color of Applied Water.		Color etc. of Filtered Water.							
			21 minutes after commenced to flow.		Average of daily observations after 21 minutes.		Average of night observations.		Maximum observation.	
	Day.	Night.	Color.	Per cent. Removed.	Color.	Per cent. Removed.	Color.	Per cent. Removed.	Day.	Night.
May 20, 1893	....	....	0.	....	3.9	....	....	....	7.	....
" 22, "	....	....	0.	....	1.3	....	....	....	2.	....
" 23, "	....	....	0.	....	0.9	....	....	....	3.	....
June 12, "	....	....	1.	....	0.1	....	....	...	1.	....
" 13, "	....	....	1.	....	1.0	....	....	....	2.	....
" 14, "	...	....	0.	....	0.6	....	....	...	2.	....
" 15, "	....	....	0.	....	0.0	....	....	....	0.	....
" 17, "	....	....	0.	....	1.1	....	....	....	3.	....
" 19, "	....	....	0.	....	0.7	....	....	...	3.	....
" 20, "	....	....	0.	....	1.4	....	....	....	4.	....
" 28, "	....	....	2.	....	1.7	....	....	....	5.	....
Average from May 20 to June 28.	....	....	0.36	....	1.2	....	...	....	....	....
June 28, 1893	....	....	...	...	2.0	....	5.2	....	2.	10.
" 29, "	+10.0	....	1.	90.0	1.5	85.0	....	....	3.	....

June 29 and 30, 1893..	....	....	....	....	....	....	2.7	....	...	5.
" 30, 1893.........	+10.0	...	2.	80.0	4.0	60.0	2.8	....	5.	4.
July 1, 1893.........	10.0	....	....	....	4.0	60.0	....	....	5.	....
" 3, "	10.0	....	1.	90.0	2.2	78.0	....	....	4.	....
" 5, "	10.0	....	1.	90.0	1.3	87.0	....	....	2.	....
" 6, "	+10.0	....	3.	70.0	3.6	64.0	3.3	....	6.	6.
" 8, "	10.0	....	1.	90.0	1.8	82.0	....	....	3.	....
" 11 and 12, 1893..	10.0	....	1.	90.0	0.6	94.0	5.9	....	2.	8.
" 19, 1893.........	+10.0	....	2.	80.0	1.2	88.0	3.0	....	2.	4.
" 20, "	+10.0	....	2.	80.0	1.4	86.0	4.7	....	3.	5.
" 24, "	....	....	2.	....	1.2	....	....	....	2.	....
" 25, "	+10.0	....	1.	90.0	1.4	86.0	....	....	3.	....
" 26, "	....	....	1.	....	1.3	....	....	....	2.	....
" 27, "	+10.0	....	1.	90.0	1.1	89.0	....	....	2.	....
Aug. 2, "	....	....	2.	....	1.8	....	....	....	3.	....
" 3, "	+10.0	....	1.	90.0	1.5	85.0	....	....	3.	....
" 5, "	+10.0	....	1.	90.0	1.0	90.0	....	....	1.	....
" 7, "	+10.0	....	1.	90.0	1.1	89.0	....	....	2.	....
" 8, "	+10.0	....	1.	90.0	1.9	81.0	....	....	3.	....
" 10, "	+10.0	....	1.	90.0	1.6	84.0	....	....	3.	....
" 11, "	+10.0	....	2.	80.0	1.9	81.0	....	....	4.	....
" 14, "	+10.0	....	1.	90.0	2.0	80.0	....	....	4.	....
" 16, "	+10.0	....	0.	100.0	1.5	85.0	....	....	4.	....
" 17, "	+10.0	....	1.	90.0	1.5	85.0	....	....	3.	....
" 23, "	6.0	....	....	....	1.0	83.3	....	....	3.	....
Sept. 6, "	4.3	....	1.	76.7	0.8	81.4	....	...	2.	....
" 7, "	5.0	....	0.	100.0	0.8	84.0	....	....	2.	....
" 8, "	4.5	....	1.	77.8	1.0	77.8	....	....	1.	....
" 9, "	4.8	....	0.	100.0	0.7	85.4	1.7	....	1.	2.
" 11, "	4.0	....	0.	100.0	0.9	77.5	1.6	....	2.	2.

TABLE NO. 21.—CONTINUED.

DATE.	Average color of Applied Water.		Color etc. of Filtered Water.							
			21 minutes after commenced to flow.		Average of daily observations after 21 minutes.		Average of night observations.		Maximum observation.	
	Day.	Night.	Color.	Per cent. Removed.	Color.	Per cent. Removed.	Color.	Per cent. Removed.	Day.	Night.
Sept. 27, 1893..........	4.0	....	0.	100.0	0.8	80.0	1.5	....	1.	2.
" 28, "	4.0	....	1.	75.0	1.0	75.0	0.9	....	1.	1.
" 29, "	5.0	....	0.	100.0	0.9	82.0	1.0	....	1.	1.
" 30, "	4.0	....	1.	75.0	1.2	70.0	0.6	....	2.	1.
Oct. 2, "	4.0	....	1.	75.0	0.9	77.5	1.2	....	1.	2.
" 3, "	4.5	....	1.	77.8	0.8	82.2	1.6	....	1.	2.
" 4, "	5.0	....	1.	80.0	1.0	80.0	1.0	....	1.	1.
" 5, "	4.2	....	1.	76.2	0.9	78.6	1.6	....	2.	3.
" 6, "	4.0	....	1.	75.0	0.9	77.5	1.0	....	2.	1.
" 11, "	5.0	....	1.	80.0	0.7	86.0	1.2	....	1.	2.
" 12, "	5.0	....	1.	80.0	0.9	82.0	1.2	....	1.	2.
" 17, "	5.0	....	0.	100.0	0.7	86.0	1.7	....	1.	2.
" 23, "	4.0	....	0.	100.0	0.6	85.0	....	....	1.	....
" 23, "	6.0	....	....	....	1.0	83.3	2.1	....	1.	3.
" 25, "	6.0	....	0.	100.0	0.9	85.0	1.3	....	1.	2.
" 26, "	6.1	....	1.	83.6	1.1	82.0	....	....	2.	....
Average from June 28 to Oct. 26.	7.3	....	0.98	87.1	1.4	81.4	2.1	....	....	....
Oct. 28, 1893.........	6.3	....	1.	84.1	1.8	71.4	1.0	....	3.	1

Oct. 30, 1893	7.8	....	1.	87.2	1.1	85.9	2.0	....	2.	2.
" 31, "	7.0	....	1.	85.7	1.2	82.9	2.6	....	2.	3.
Nov. 1, "	6.0	....	1.	83.3	1.4	76.7	2.6	....	2.	3.
" 2, "	6.0	....	1.	83.3	1.1	81.7	2.5	....	2.	3.
" 3, "	6.3	....	1.	84.1	1.3	79.4	2.6	....	2.	3.
" 6, "	7.0	....	2.	71.4	1.5	78.6	....	....	2.	....
" 6, "	7.0	7.0	2.	71.4	2.9	58.6	3.5	50.0	2.	4.
" 7, "	7.0	7.0	....	....	1.4	80.0	3.9	44.3	3.	6.
" 8, "	7.0	7.0	2.	71.4	1.3	81.4	3.3	52.9	2.	5.
" 9, "	7.0	7.1	2.	71.4	1.1	84.3	1.3	81.7	2.	3.
" 10, "	7.0	6.3	1.	85.7	1.4	80.0	2.1	66.7	2.	3.
" 11, "	6.0	6.4	1.	83.3	1.4	76.7	2.5	60.9	2.	3.
" 13, "	6.0	6.0	1.	83.3	1.4	76.7	2.5	55.6	3.	3.
" 14, "	6.0	6.8	1.	83.3	1.5	76.6	3.3	52.2	2.	4.
" 15, "	6.0	6.0	1.	83.3	1.0	83.3	2.2	63.3	1.	3.
" 16, "	6.0	6.5	1.	83.3	1.3	78.2	1.8	72.3	2.	3.
" 17, "	5.9	6.0	1.	83.1	1.0	83.1	1.4	76.7	1.	2.
" 18, "	6.0	6.0	1.	83.3	1.3	78.3	2.8	53.3	2.	3.
" 20, "	5.0	5.0	1.	80.0	1.0	80.0	1.5	70.0	1.	2.
" 21, "	5.0	5.0	1.	80.0	1.0	80.0	1.1	78.0	1.	2.
" 22, "	6.0	6.0	1.	83.3	1.0	83.3	1.7	71.7	1.	2.
" 23, "	5.0	5.7	1.	80.0	1.1	78.0	2.7	52.6	2.	3.
" 24, "	5.0	5.0	1.	80.0	1.1	78.0	1.2	76.0	2.	4.
" 25, "	5.3	5.0	1.	81.1	1.3	75.9	2.5	50.0	2.	3.
" 27, "	5.0	5.0	1.	80.0	1.0	80.0	1.0	80.0	1.	1.
" 28, "	5.0	5.1	1.	80.0	1.1	78.0	2.0	60.8	2.	2.
" 29, "	5.0	5.0	1.	80.0	1.2	76.0	2.4	52.0	2.	3.
Dec. 1, "	5.0	5.0	1.	80.0	1.1	78.0	2.0	60.0	2.	2.
" 2, "	5.0	5.0	2.	60.0	1.1	78.0	1.5	70.0	2.	2.
" 4, "	5.0	5.0	1.	80.0	1.2	76.0	2.1	58.0	2.	3.

Table No. 21.—concluded.

Date.	Average color of Applied Water.		Color etc. of Filtered Water.							
			21 minutes after commenced to flow.		Average of daily observations after 21 minutes.		Average of night observations.		Maximum observation.	
	Day.	Night.	Color.	Per cent. Removed.	Color.	Per cent. Removed.	Color.	Per cent. Removed.	Day.	Night.
Dec. 5, 1893	5.0	5.0	1.	80.0	1.2	76.0	1.7	66.0	2.	3.
" 6, "	5.0	6.0	1.	80.0	1.0	80.0	1.7	71.7	1.	2.
" 7, "	5.0	5.0	1.	80.0	1.3	74.0	1.5	70.0	2.	2.
" 8, "	5.0	5.0	1.	80.0	1.1	78.0	2.3	54.0	2.	3.
" 12, "	5.0	5.0	1.	80.0	1.2	76.0	2.3	54.0	2.	3.
" 13, "	5.3	6.0	1.	81.1	1.3	75.5	2.5	58.3	2.	3.
" 14, "	6.0	6.0	1.	83.3	1.4	76.7	2.4	60.0	2.	3.
" 15, "	6.0	6.0	1.	83.3	1.4	76.7	1.9	68.3	2.	3.
" 18, "	6.0	6.0	1.	83.3	1.1	81.7	1.2	80.0	2.	2.
" 19, "	6.0	6.0	1.	83.3	1.3	78.3	2.0	66.7	2.	2.
" 20, "	6.0	6.0	1.	83.3	1.1	81.7	1.4	76.7	2.	2.
" 21, "	6.0	6.0	1.	83.3	1.3	78.3	1.6	73.3	2.	2.
" 22, "	6.0	6.0	1.	83.3	1.3	78.3	1.7	71.7	2.	2.
" 26, "	5.0	5.0	1.	80.0	1.0	80.0	1.0	80.0	1.	1.
" 27, "	5.0	5.0	1.	80.0	1.0	80.0	1.0	80.0	1.	1.
" 28, "	5.0	5.0	1.	80.0	1.0	80.0	1.2	76.0	1.	2.
" 29, "	5.0	5.0	1.	80.0	1.0	80.0	1.0	80.0	1.	1.
Jan. 1, 1894	5.0	5.0	1.	80.0	1.0	80.0	1.0	80.0	1.	1.
" 2, "	5.0	5.0	1.	80.0	1.0	80.0	1.0	80.0	1.	1.
" 3, "	5.0	5.0	1.	80.0	1.0	80.0	1.0	80.0	1.	1.
" 4, "	5.0	5.0	1.	80.0	1.0	80.0	1.0	80.0	1.	1.

Jan. 5, 1894.	5.0	5.0	1.	80.0	1.0	80.0	1.0	80.0	1.	1.
" 8, "	5.0	5.0	1.	80.0	1.0	80.0	1.5	70.0	1.	2.
" 9, "	5.0	5.0	1.	80.0	1.1	78.0	2.0	60.0	2.	2.
" 10, "	5.0	5.0	1.	80.0	1.0	80.0	1.1	78.0	1.	2.
" 11, "	5.0	5.0	1.	80.0	1.3	74.0	2.0	60.0	2.	2.
" 12, "	5.0	5.0	1.	80.0	1.0	80.0	1.0	80.0	1.	1.
" 15, "	5.0	5.0	1.	80.0	1.0	80.0	1.1	78.0	1.	2.
" 16, "	5.0	4.8	1.	80.0	1.2	76.0	2.0	58.3	2.	2.
" 17, "	5.0	5.0	1.	80.0	1.0	80.0	1.1	78.0	1.	2.
" 18, "	5.0	5.0	1.	80.0	1.3	74.0	2.3	54.0	2.	3.
" 19, "	5.0	5.0	1.	80.0	1.0	80.0	1.0	80.0	1.	1.
" 20, "	5.0	5.0	1.	80.0	1.1	78.0	....	....	2.	....
" 22, "	4.5	4.0	1.	77.8	1.0	77.8	1.0	75.0	1.	1.
" 23, "	4.5	....	1.	77.8	1.0	77.8	....	....	1.	1.
" 24, "	4.0	4.0	1.	75.0	1.2	70.0	2.0	50.0	2.	2.
" 25, "	4.0	4.0	1.	75.0	1.0	75.0	1.0	75.0	1.	1.
" 26, "	4.0	4.0	1.	75.0	1.2	70.0	2.3	42.5	2.	3.
" 27, "	4.0	....	1.	75.0	1.0	75.0	....	....	1.	....
" 29, "	4.0	4.0	1.	75.0	1.2	70.0	2.5	37.5	2.	3.
" 30, "	4.0	4.0	1.	75.0	1.2	70.0	2.4	40.0	2.	3.
Average from Oct. 28, 1893, to Jan. 30, 1894..............	5.4	5.4	1.1	79.9	1.2	77.9	1.8	66.3	....	....

Table No. 22. — Part 1.

*Relating to the Filtration of Water at Lawrence, Massachusetts, compiled from data obtained from the Report of the State Board of Health of Massachusetts for the year 1892.**

Filters.	Kind of Material.	Depth of Material.	Effective size of Sand in Millimeters.	Loam layers. Thickness in Inches.	Loam layers. Depth below surface in Inches.	Average Rate of Filtration per Acre, in Gallons, per 24 Hours.	Kind of Filtration.	Per cent. of Water Bacteria Removed. By Daily Samples.	Per cent. of Water Bacteria Removed. By Total Numbers.	Remarks.
18A,	Sand.	5 ft. 3 in.	0.48	0	0	1,294,000	Intermittent.	(98.7) 98.7	(99.3) 99.2	Started September, 1889.
41,	Sand and Loam.	5 " 0 "	0.14	3½	9	1,596,000	Intermittent.	(99.2) 98.6	(99.7) 99.6	Constructed May 9, 1892.
33A.	Sand.	5 " 0 "	0.14	0	0	1,862,000	Continuous.	(98.9) 97.6	(99.5) 99.2	Started April 28, 1892.
34A,	Sand.	5 " 0 "	0.09	0	0	1,718,000	Continuous.	(99.1) 98.5	(99.7) 99.5	Constructed April 28, 1892.
35A.	Sand and Loam.	4 " 9½ "	0.20	1	12	1,423,000	Intermittent.	(99.2) 98.0	(99.5) 98.8	Started March 30, 1892.
36A,	Sand and Loam.	4 " 10 "	0.20	1	12	1,778,000	Continuous.	(98.6) 98.0	(99.4) 99.3	Started March 30, 1892.
37,	Sand.	5 " 1 "	0.20	0	0	1,663,000	Continuous.	(98.4) 98.0	(99.5) 99.3	Constructed April 18, 1892.
38,	Sand.	2 " 0 "	0.20	0	0	1,714,000	Continuous.	(97.9) 97.9	(99.3) 99.3	Started April 28, 1892.
39,	Sand.	1 " 0 "	0.20	0	0	1,733,000	Continuous.	(98.3) 98.2	(99.3) 99.2	Started April 28, 1892.
40,	Sand and Loam.	1 " 0 "	0.20	1	11	1,288,000	Continuous.	(97.9) 95.8	(99.4) 98.6	Constructed April 28, 1892.
42,	Sand.	1 " 1 "	0.20	0	0	2,252,000	Continuous.	(96.6) 95.8	(98.1) 97.8	Started October 29, 1892.

* See description of tables.

TABLE NO. 22. — PART 2.

Showing the number of times, from June 1 to November 30, 1892, inclusive, that Percentages of ONE PER CENT. AND MORE, *of the Applied Water Bacteria,* APPEARED *in the Filtered Water of the Lawrence Experimental Filters mentioned above. Also the Percentages that the number of times are of the Total Number of Results obtained.*

FILTERS AND TOTAL RESULTS.

PER CENTS.	18A.		41.		33A.		34A.		35A.		36A.		37.		38.		39.		40.		42. (26 days.)	
	Total 92.		Total 126.		Total 144.		Total 143.		Total 128.		Total 145.		Total 144.		Total 145.		Total 145.		Total 115.		Total 26.	
	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.
1	11	12.0	10	7.9	12	8.3	4	2.8	10	7.8	13	9.0	9	6.3	18	12.4	18	12.4	8	7.0	6	23.1
2	14	15.2	7	5.6	16	11.1	10	7.0	12	9.4	4	2.8	7	4.9	11	7.6	12	8.3	10	8.7	6	23.1
3	2	2.2	4	3.2	5	3.5	3	2.1	3	2.3	2	1.4	4	2.8	10	6.9	11	7.6	3	2.6	3	11.5
4	2	2.2	1	0.8	..	..	1	0.7	..	..	1	0.7	..	..	7	4.8	2	1.4	5	4.3	2	7.7
5	1	1.1	2	1.6	1	0.7	..	..	..	..	2	1.4	2	1.4	4	2.8	2	1.4	3	2.6	..	..
6	..	..	..	..	2	1.4	..	..	1	0.8	2	1.4	..	..	..	..	2	1.4	1	0.9	1	3.8
7	..	..	2	1.6	1	0.7	1	0.7	1	0.8	1	0.7	1	0.7	2	1.4	1	0.7	1	0.9	..	..
8	1	1.1	..	..	..	..	1	0.7	1	0.8	2	1.4	2	1.4	..	..	..	..	..	..	..	..
9	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	0.7	2	1.4	..	..	..	..
10	..	..	1	0.8	2	1.4	1	0.7	..	..	2	1.4	1	0.7	..	..	3	2.1	2	1.7	1	3.8
15	2	2.2	..	..	..	..	1	0.7	..	..	2	1.4	1	0.7	3	2.1	4	2.8	2	1.7	2	7.7
20	..	..	..	..	1	0.7	1	0.7	..	..	1	0.7	1	0.7	..	..	..	..	..	..	..	..
25	..	..	..	..	..	..	2	1.4	..	..	..	..	2	1.4	..	..	..	..	2	1.7	1	3.8
30	..	..	..	..	..	..	1	0.7	..	..	..	..	..	..	..	..	..	..	..	..	..	..
35	..	..	..	..	..	..	..	..	..	..	1	0.7	..	..	..	..	..	..	..	..	..	..
40	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
45	..	..	..	..	..	..	..	..	..	..	..	..	2	1.4	..	..	..	..	..	..	..	..
50	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
60	..	..	..	..	2	1.4	..	..	..	..	..	..	..	..	..	..	..	..	2	1.7	..	..
70	..	..	1	0.8	..	..	..	..	1	0.8	1	0.7	..	..	..	..	..	..	1	0.9	..	..
80	..	..	..	..	1	0.7	..	..	1	0.8	..	..	..	..	1	0.7	..	..	1	0.9	..	..
Totals.	33	35.9	28	22.2	43	29.9	26	18.2	30	23.4	34	23.4	32	22.2	57	39.3	57	39.3	41	35.7	22	84.6

TABLE NO. 22. — PART 3.

Showing the number of times, from June 1 to November 30, 1892, inclusive, that Percentages of the Applied Water Bacteria REMOVED *(by the Lawrence Experimental Filters), were* ONE PER CENT. AND MORE LESS THAN THE AVERAGE PER CENT. REMOVED. *Also the Percentages that the number of times are of the Total Number of Results obtained.*

Per Cents Less than the Average.	FILTERS AND TOTAL RESULTS.																					
																					26 days.	
	18A.		41.		33A.		34A.		35A.		36A.		37.		38.		39.		40.		42.	
	Average 98.7		Average 98.6		Average 97.6		Average 98.5		Average 98.0		Average 98.0		Average 98.0		Average 97.9		Average 98.2		Average 95.8		Average 95.8	
	Total 92.		Total 126.		Total 144.		Total 143.		Total 128.		Total 145.		Total 144.		Total 145.		Total 145.		Total 115.		Total 26.	
	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.	Number of Times.	Per cent. of Total.
1	2	2.2	4	3.2	..	..	3	2.1	2	1.6	1	0.7	2	1.4	7	4.8	4	2.8	3	2.6	..	..
2	1	1.1	1	0.8	..	..	..	..	..	..	1	0.7	..	..	7	4.8	3	2.1	1	0.9	1	3.8
3	2	2.2	1	0.8	3	2.1	1	0.7	..	..	2	1.4	2	1.4	4	2.8	1	0.7	1	0.9	..	..
4	1	1.1	2	1.6	..	..	..	..	1	0.8	2	1.4	..	..	..	..	2	1.4	..	..	..	..
5	..	..	1	0.8	1	0.7	..	..	1	0.8	1	0.7	1	0.7	2	1.4	1	0.7	..	..	..	..
6	..	..	1	0.8	..	..	1	0.7	1	0.8	2	1.4	2	1.4	..	..	1	0.7	1	0.9	..	..
7	1	1.1	..	..	1	0.7	1	0.7	..	..	..	..	..	..	1	0.7	3	2.1	..	..	..	..
8	..	..	..	..	1	0.7	..	..	..	..	..	..	1	0.7	..	..	1	0.7	1	0.9	1	3.8
9	..	..	1	0.8	..	..	..	..	..	..	1	0.7	..	..	..	..	1	0.7	..	..	..	..
10	..	..	..	..	..	..	2	1.4	..	..	2	1.4	1	0.7	1	0.7	2	1.4	2	1.7	1	3.8
15	2	2.2	..	..	1	0.7	..	..	..	..	2	1.4	..	..	2	1.4	2	1.4	..	..	1	3.8
20	..	..	..	..	..	..	2	1.4	..	..	..	..	2	1.4	..	..	..	..	2	1.7	1	3.8
25	..	..	..	..	..	..	1	0.7	..	..	..	..	1	0.7	..	..	..	..	..	..	..	..
30	..	..	..	..	..	..	1	0.7	..	..	1	0.7	..	..	..	..	..	..	..	..	..	..
35	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
40	..	..	..	..	..	..	..	..	..	..	..	..	1	0.7	..	..	..	..	..	..	..	..
45	..	..	..	..	..	..	..	..	..	..	..	..	1	0.7	..	..	..	..	..	..	..	..
50	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
60	..	..	..	..	2	1.4	..	..	..	..	1	0.7	..	..	..	..	..	..	3	2.6	..	..
70	..	..	1	0.8	1	0.7	..	..	1	0.8	..	..	..	..	..	..	..	..	..	..	..	..
80	..	..	..	..	..	..	..	..	1	0.8	..	..	..	..	1	0.7	..	..	1	0.9	..	..
Totals.	9	9.8	12	9.5	10	6.9	12	8.4	7	5.5	16	11.0	14	9.7	25	17.2	21	14.5	15	13.0	5	19.2

(8.7. is the Average. of the "Totals" of the columns headed "Per cent. of Total," of Filters from 18A to 37 inclusive).

TABLE NO. 22. — PART 4.

SUMMARY of Parts 2 and 3, showing the Percentages that the number of times, that MORE THAN TWO PER CENT., of the Applied Water Bacteria, APPEARED in the Filtered Water, are of the Total Number of Results obtained. Also the Percentages that the number of times, that Percentages of the Applied Water Bacteria Removed, that were MORE THAN TWO PER CENT. LESS THAN THE AVERAGE PER CENT. REMOVED, are of the Total Number of Results obtained.

Filters.	Depth of Filtering Medium.	Percentages that the number of times, that More than Two Per cent., of the Applied Water Bacteria, Appeared in the Filtered Water, are of the Total Number of Results obtained.	Percentages that the number of times, that Percentages of the Applied Water Bacteria Removed, that were More than Two Per cent. Less than the Average Per cent. Removed, are of the Total Number of Results obtained.	Total Number of Results obtained.
18A,	5 ft. 3 in.	8.7	6.5	92
41,	5 " 0 "	8.7	5.6	126
33A,	5 " 0 "	10.4	6.9	144
34A,	5 " 0 "	8.4	6.3	143
35A,	4 " 9½ "	6.3	3.9	128
36A,	4 " 10 "	11.7	9.7	145
37,	5 " 1 "	11.1	8.3	144
		Average 9.3	Average 6.7	
38,	2 " 0 "	19.3	7.6	145
39,	1 " 0 "	18.6	9.7	145
40,	1 " 0 "	20.0	9.6	115
42,	1 " 1 "	38.5	15.4	26

Conclusions.

As, has already been stated under the head of "Bacteriological Work," I consider the bacteriological results previous to October 17, with the exception of those of Professor H. C. Ernst, to be somewhat unreliable on account of the bacterial colonies not having been cultivated a sufficient length of time to reach their full growths and, also, as "Fifteen-per-cent Gelatin" was used the greater part of the time instead of "Ten-per-cent Gelatin," I did not make use of them, but in an incidental manner, in forming my conclusions relative to the efficiency of the Experimental Morison Mechanical Filter.

Subsequent investigations, however, which I have previously mentioned, that were made since October 17, for the purpose of determining, if possible, the difference that there would have been if the colonies of bacteria had been cultivated longer and "Ten-per-cent Gelatin" used the whole of the time, previous to October 17, lead me to think that the average efficiency of the filter for the removal of water bacteria, determined from the results of all the runs of the Morison Mechanical Filter previous to October 17, while Basic Sulphate of Alumina and "Free Flow" were being used, was very nearly 99.0 per cent.

This result is corroborated, to a certain extent, by check-counts that were made by Professor H. C. Ernst, of the Harvard University Medical School, on July 20 and 21, and October 3, 4, 5 and 6, which are given in detail in the Bacteriological tables.

It will be seen by the tables that the Average Result of the efficiency of the filter by the counts made by Professor H. C. Ernst in July and October was more than 99.0 per cent., and that from October 17 to November 11, the Average Result was about 99.0 per cent., and that after November 11, about the time when Bacillus Prodigiosus was applied, the efficiency of the filter commenced to decrease. I shall, therefore, assume that the average efficiency of the filter for the removal of water bacteria, from April 5, 1893, to November 11, 1893, while Basic Sulphate of Alumina and "Free Flow" were being used, was about 99.0 per cent., and, as will be seen by the tables, from November 23 to January 8, at the time Bacillus Prodigiosus was used (which will be referred to in detail hereafter), the Average Result was reduced to about 96.0 per cent.

The use of Bacillus Prodigiosus was discontinued on January 8, and from January 9 to 23, the filter was run in the ordinary way with the Applied Water in its normal condition, and as will be seen by the Bacteriological tables, the Average Result was still further reduced during this time to 92.8 per cent.

The filter-bed was steamed and boiled on December 7, and on December 11. On December 7, steam was injected through the wash-pipe and forced up through the bed for one hour with an applied pressure of about twenty pounds per square inch. The bed was then washed and a sufficient depth of water having been left in the filter, to thoroughly saturate the bed, the bed was boiled for more than one hour. On December 11, the filter having been run as usual since December 7, the filter-bed was again thoroughly saturated with water and boiled for one hour and fifty minutes. There was not any improvement in the bacterial results, however, after either of these procedures.

Investigations were also made to ascertain if the low temperature of the Applied Water had anything to do with the decreased efficiency of the filter. A number of experiments were made by adding Basic Sulphate of Alumina at the rate of one-half ($\frac{1}{2}$) grain per gallon to water that was maintained at the temperature of about 75° and about 36° in glass jars, and it was found that a perceivable flocculent precipitate formed much quicker in the water at a temperature of about 75° than it did at a temperature of about 36°. Two runs were then made with the filter (on January 6 and 8), the Applied Water being maintained at the average temperature of 71° by the injection of steam. The results obtained during these two runs did not indicate that there was any improvement in the efficiency of the filter.

I then came to the conclusion, after the use of Bacillus Prodigiosus had been discontinued and the filter run from January 9 to 23, with the Applied Water in its normal condition, that the quartz grains of the filter-bed had become covered with foreign matter, and that it was quite possible that there were accumulations of the same in other parts of the filter, upon which bacteria were feeding and growing, and that many of the bacteria that had appeared in the samples of Filtered Water since November 23, originated from this source.

As the abnormal condition of the filter-bed was first noticed a day or two after the first application of the Bacillus Prodigiosus, it is possible that the solutions containing the same had something

to do with the above-mentioned condition of the filter. This is hardly probable, however, as on July 27 and August 17, and October 11 and 12, one (1) liter of bouillon containing Cruickshank's Bacillus was daily applied to the filter without having any apparent detrimental effect.

After consulting with Professor J. H. Appleton, and experimenting with several salts and acids upon small quantities of quartz taken from the filter-bed, it was found that a solution of one (1) part of Caustic Soda and twenty-four (24) parts of water would cleanse the samples of quartz very thoroughly, the quartz being bleached during the operation from a dark brown color, to a color which was very nearly as light as the original color of the quartz when it was first put into the filter. It was decided, owing to this discovery, to cleanse the filter with the above-mentioned solution. This was done by washing the filter and filter-bed, under a head of about twenty-five feet, in the same manner that was generally followed in washing the filter and filter-bed with water, with the exception that the filter and bed were washed three times with the same solution, the solution being drained off and pumped up into a tank at the end of each washing.

When the Caustic Soda solution was drained from the filter, at the end of each washing, it was done very slowly allowing the bed to soak in the solution from fifteen (15) to twenty (20) minutes.

After the filter was washed with the Caustic Soda solution, as will be seen by the Bacteriological tables, the average efficiency of the filler was increased from 92.8 per cent., which was the average from January 9 to 23, to 98.8 per cent.

The inefficient working of the filter from November 23 to January 23, may have been influenced to a certain extent by the Applied Water having been quite clear and almost entirely free from suspended matter, it averaging during this time, as may be seen by table No. 21, showing the Color during each run of the filter, about five (5), while from October 17 to November 11, the average Color was about seven (7). Therefore, as the best work of the filter before November 23, seems to have been done when there was more suspended matter in the Applied Water than there was between November 23 and January 23, it would seem to indicate that a small quantity of suspended matter in the Applied Water exerted a beneficial influence in forming the supplementary filtering medium at the upper part of the quartz-bed.

If this reasoning is correct, the filter would have done better

work after it had been washed with the Caustic Soda solution, if there had been more suspended matter in the Applied Water, as, at this time it was remarkably clear, and its color was the least that it had been during the work, namely :—four (4).

The average efficiency of the filter for removing Water Bacteria during the entire time it was running, from October 17 to January 30 inclusive, as may be seen by table No. 9, was about 95.2 per cent. I do not consider 95.2 a fair average, however, as undoubtedly between November 23 and January 23, the quartz grains of the filter-bed were, more or less, covered with growths of bacteria, and it is quite possible that bacteria were propagating in the other parts of the filter.

I have, therefore, based my bacteriological conclusions, which are to follow, upon the work that was done from October 17 to November 11, when the filter, from a bacteriological standpoint, appeared to be in its normal condition, and from January 24 to January 30, after the bed had been washed with the solution of Caustic Soda and water, and again brought to its normal condition.

I have assumed in preparing the estimate, which will follow, of the cost of operating a large Mechanical Filter Plant, that it will be necessary to wash the filters of the plant once every six (6) months with a solution containing Caustic Soda. The time that really elapsed during the experiments with the Experimental Morison Mechanical Filter, after commencing to use Basic Sulphate of Alumina, before the filter appeared to contain growths of bacteria, was rather more than seven months, but as the filter was not running during the entire time, and in order to be on the safe side in making the estimate, I decided to assume six (6) months, as mentioned above.

The Average Percentages relative to the Morison Mechanical Filter, which I shall quote hereafter in connection with Bacteriological Work, will be the End Growths given in table No. 9, under the heading of "Samples that were taken One Hour or More after water commenced to flow from the filter," and the Average Percentages under the heading of "End Growths" given in table No. 10, relating to Samples taken Thirty Minutes or Less after water commenced to flow from the filter.

I will now sum up in detail the different points of investigation, relative to the Experimental Morison Mechanical Filter, which are mentioned on page 36.

First.—The chemicals best adapted for the purification of Pawtuxet River Water, viz.:—

Basic Sulphate of Alumina. The quality used contained from 15.8 to 17.5 per cent. of Alumina ($Al_2 O_3$).

Second.—The best method of applying the chemicals and the quantity to add to the Applied Water for each gallon of water filtered, viz.:—

The method of doing this has already been described, and I think the experiments have demonstrated that Basic Sulphate of Alumina added to the Applied Water at the rate of one-half ($\frac{1}{2}$) grain per gallon, and "Free Flow" gave as good results as three-fourths ($\frac{3}{4}$) of a grain and "Free Flow," that we have repeatedly tried, and a larger quantity than three-fourths ($\frac{3}{4}$) and "Free Flow" that was tried in several instances, as will be seen in the tables. I shall, therefore, base my estimates upon six-tenths ($\frac{6}{10}$) of a grain of Alumina per gallon, including "Free Flow" (for an average run of 16 hours and 43 minutes), that being equivalent to one-half ($\frac{1}{2}$) grain per gallon while in effective service.

Third.—If any portion of the chemicals that were added to the Applied Water were present in the Filtered Water, viz.:—

The results, that I have mentioned, that were obtained by applying the Logwood and Acetic Acid test for Alum, in conjunction with filter-paper, have demonstrated, I think, that none of the Basic Sulphate of Alumina was present during the experiments in the Filtered Water, in its original state, after the water had been flowing from the filter twenty-one (21) minutes. The only indication of Alumina, found in the Filtered Water, was a minute quantity of finely suspended hydrate, resulting from the addition of the Alumina, that came through the filter-bed with the water that was being filtered.

It is also shown in table No. 20, by an analysis made June 7, 1893, that the Oxide of Aluminium or Alumina (Al_2O_3), found in the Filtered Water was forty-seven (47) per cent. less than it was in the River Water, and that on October 11, 1893, twenty-three (23) minutes after the water commenced to flow from the filter, the Alumina, etc. ($Fe_2 O_3$), in the Filtered Water was practically the same as that in the Applied Water.

An analysis by Professor Thomas M. Drown, whose report is appended to this report, shows that 0.0292 of a grain of Alumina ($Al_2 O_3$), per gallon, was found in a sample of Pawtuxet River Water, that had been taken directly from the river and afterwards filtered through a double thickness of Swedish paper, and that 0.0584 of a grain of Alumina (Al_2O_3), per gallon, was found in a sample of the same water, after Sulphate of Alumina had been added to it, at the rate of one-half ($\frac{1}{2}$) grain per gallon, and the very slight flocculent precipitate produced filtered off through a double thickness of filter-paper, showing an increase of Alumina ($Al_2 O_3$), of 0.0292 of a grain.

Fourth.—The rate in gallons per Acre per 24 hours which could be efficiently filtered, viz.:—

The Bacteriological tables show that the water has been filtered successfully from a rate of 90,000,000 gallons to a rate of 193,000,000 gallons per Acre per 24 hours, the average rate of filtration being about 128,000,000. If a mechanical filter-plant should be constructed for the City of Providence, however, I should recommend that its average capacity be based upon a rate of 100,000,000 gallons per Acre per 24 hours, in order to have a sufficient reserve to insure the practical working of the plant while several filters are being washed at the same time, and to meet unforeseen contingencies which may arise in the future, etc., etc.

Fifth.—The Bacteriological and Chemical purification of the water, viz.:—

The following table gives the Average of the Percentages, from October 17 to November 11, 1893, and from January 24 to 30, 1894, given in tables from No. 2 to No. 8 inclusive, of Applied Water Bacteria, which were Removed by the filter, determined from Samples of Filtered Water, that were taken Thirty Minutes or Less and One Hour or More, after water commenced to flow from the filter.

Including Samples taken *Thirty Minutes or Less* after water commenced to flow from the filter, and those taken at the *Same Hour as the Applied Water* (which was One Hour or More after water commenced to flow from the filter).		Including Samples taken *Thirty Minutes or Less*, and all *Samples taken One Hour or More*, after water commenced to flow from the filter.	
End Growths.	Growths of about 90 Hours.	End Growths.	Growths of 85 Hours or More and End Growths.
98.6	98.7	98.6	98.7

This table shows that the average efficiency of the filter for removing water bacteria was 98.6 per cent., (from October 17 to November 11, 1893, and from January 24 to January 30, 1894, when the filter-bed was apparently free from growths of bacteria).

A comparison of the Average Percentage of Removal of Applied Water Bacteria of the Experimental Morison Mechanical Filter, with the Average of Percentages of Removal computed from results obtained by Natural Filtration with the Experimental Filters at Lawrence, Mass., mentioned in the description of table No. 22, and referred to in the First part of table No. 22, as having beds about five (5) feet deep, is as follows:—

Morison Mechanical Filter.

Average Percentage of Removal........... 98.6

Natural Filters at Lawrence, Mass.

Average of the Average Percentages of Removal, given in the Ninth column of the first part of table No. 22, not inclosed in parentheses, 98.2

Morison Mechanical Filter............More 00.4 per cent.

Natural Filters at Lawrence, Mass.

Average of the Average Percentages of Removal, given in the Ninth column of the first part of table No. 22, inclosed in parentheses, 98.9

Morison Mechanical Filter............Less 00.3 per cent.

Natural Filters at Lawrence, Mass.

Average of the Average Percentages of Removal, given in the Tenth column of the first part of table No. 22, not inclosed in parentheses,	99.3	
Morison Mechanical Filter ....Less	00.7	per cent.

Natural Filters at Lawrence, Mass.

Average of the Average Percentages of Removal, given in the Tenth column of the first part of table No. 22, inclosed in parentheses,	99.5	
Morison Mechanical Filter ....Less	00.9	per cent.

I do not consider that the efficiency of a filter should be entirely based upon the average results obtained, although this is generally the standard upon which the efficiency is based, but that the worst results obtained should be duly considered. In order to present my ideas upon this subject more clearly I will assume a rather improbable case. For example, if one hundred individual results were used in working up an average, 90 of these results might each show an efficiency of 100 per cent., and 10 of them might each show an efficiency of only 80 per cent., or in other words 10 per cent. of the Total Results would be 18 per cent. below the Average Result, which in my opinion would be sufficient grounds to condemn a filter. Yet the average of the whole number would be 98.0 per cent., which is a very good result. The tables from No. 11 to No. 18 inclusive and table No. 22 were prepared in order to make comparisons of this kind.

It is shown in table No. 9, that the average efficiency of the Experimental Morison Mechanical Filter is 98.7 per cent. (computed from all of the results that were obtained from samples that were collected *One Hour or More* after water commenced to flow from the filter), and by inspecting table No. 12, it can be seen that 16.7 per cent. of the Total Results are from 1 to 3 per cent. Less than the Average Result, also by inspecting table No. 13, it can be seen that 6.7 per cent. of the Total Results are More than 2 per cent. Less than the Average Result, namely: 2 of 3 per cent. each. It is also shown in table No. 10, that the average efficiency of the filter,

Thirty Minutes or Less after water commenced to flow, is 96.1 per cent., and by inspecting table No. 16, it can be seen that 23.1 per cent. of the Total Results are from 1 to 7 per cent. Less than the Average Result, also by inspecting table No. 17, it can be seen that 23.1 per cent. of the Total Results are More than 2 per cent. Less than the Average Result, namely :—from 3 to 7 per cent.

The results given in tables Nos. 14 and 18 I have not considered in the above comparisons, as they cover periods during which the filter contained growths of bacteria (from November 23, 1893, to January 9, 1894, and from January 9 to January 23, 1894), relative to which I have previously referred several times.

For the purpose of comparing these per cents, just mentioned, with per cents obtained with Natural Filtration, I will call attention to table No. 22, which was computed from the Report of the Massachusetts State Board of Health for the year 1892.—It can be seen by examining the Third part of this table, by the percentages given, of filters having a depth of filter-bed of about five (5) feet (I shall not consider the filters having a depth of bed less than about five (5) feet, as I should not suppose they would be used in ordinary practice), that 8.7 per cent. of the Total Results are from 1 to 80 per cent. Less than the Average Result, and by examining the Fourth part of the table it can be seen that 6.7 per cent. of the Total Results are More than 2 per cent. Less than the Average Result, namely :—from 3 to 80 per cent.

The percentages show in the comparison of the One Hour or More results of the Morison Mechanical Filter, in the case of the One and more per cents, that the percentage of the number is in favor of the Natural Filters, namely: 8.7 per cent. less than the average, to 16.7 per cent. less than the average for the Morison Mechanical Filter; but, that the range of the per cents of removal is very largely in favor of the Morison Mechanical Filter, namely: 1 to 3 per cent. less than the average, to from 1 to 80 per cent. less than the average for the Natural Filters.—And in the case of the More than 2 per cents, that the percentage of the number is the same for both filters, namely: 6.7, but, that the range of the per cents of removal, is, as above, very largely in favor of the Morison Mechanical Filter, namely: 2 of 3 per cent. less than the aver-

age, to from 3 to 80 per cent. less than the average for the Natural Filters.

The percentages show, in the comparison of the Thirty Minutes or Less results of the Morison Mechanical Filter, as compared with the daily average results of the Natural Filters, that the percentages of the number are in both instances in favor of the Natural Filters, namely:—in the case of the One and more per cents, 8.7 per cent. less than the average, to 23.1 per cent. less than the average for the Morison Mechanical Filter, and in the case of the More than two per cents, 6.7 per cent. less than the average, to 23.1 per cent. less than the average for the Morison Mechanical Filter, but that the range of the per cents of removal is very largely in favor of the Morison Mechanical Filter, namely:—from 3 to 7 per cent. less than the average, to from 3 to 80 per cent. less than the average for the Natural Filters. It should be remembered, however, that the Thirty Minutes or Less results affect the general average of a run of the Morison Mechanical Filter but in a very slight degree, as in one-half hour later at the greatest, the results are at their best, namely:—those of One Hour or More. The value of the Thirty Minutes or Less results in computing an average percentage, considering the run of the filter as 16 hours and 43 minutes, which was the average run during the experiments, would be, as compared with the value of the average of the One Hour or More results, about one (1) for the Thirty Minutes or Less results to about thirty-four (34) for the One Hour or More results.

Before proceeding any further, I will again call attention to what has previously been mentioned in the description of table No. 22, namely:—that some of the bacteria, which were found in some of the samples that I have considered in computing the percentages used in making the comparisons, the Massachusetts Report states, appeared to have had their origin in the interior of the filters and in the outlet-pipes and underdrains. It should also be borne in mind, in regard to the comparisons, that there is a considerable difference in the number of results that were used in compiling the tables upon which the comparisons are based, namely:—for table No. 22, the number of results ranged from 92 to 145, and for tables Nos. 12, 13, 16 and 17, the number of results were 13 and 30. Attention is also called to the fact, that for reasons which I

have previously mentioned in detail (on account of cold weather), the December bacterial results given in the Massachusetts Report have not been used in the discussions in that report, nor have they been tabulated or considered in the comparisons made in this report. Quite a number of the experiments, however, that were made with the Experimental Morison Mechanical Filter, as can be seen by the tables relative to the same, were made in December and January, the temperature of the building in which the filter was located being kept above the "freezing point." The approximate Mean Temperature of the Applied Water, of the Morison Mechanical Filter, was in December 35°, and in January 34°. The Lowest Temperature of the Applied Water during these two months was about 33°.

It might appear, without an explanation, as though I had not been consistent in the use of data in my bacteriological comparisons of what has been accomplished with the Experimental Morison Mechanical Filter and what has been accomplished by Natural Filtration with the Experimental Filters at Lawrence, as the only results of the Morison Mechanical Filter that were considered were those of from October 17 to November 11, 1893, and those of from January 24 to January 30, 1894, when this filter was in its normal condition, and which did not include the results that were obtained when the filter contained foreign matter upon which bacteria were propagating, while the results obtained by Natural Filtration at Lawrence, that were considered, included those in which the number of bacteria in the Filtered Water exceeded 500, the latter not being used at Lawrence, as has previously been stated, in working out the averages of the results of Natural Filtration which are given in the Massachusetts Report.

I took into consideration, however, our experience with the Experimental Morison Mechanical Filter, and, in order to express my views clearly in regard to the matter, will present the following: If a first class Mechanical Filter-plant, properly housed, should be built in accordance with the above mentioned experience, having a capacity of about 15,000,000 gallons per 24 hours, and capable of filtering at the rate of from 100,000,000 to 150,000,000 gallons per Acre per 24 hours, and it should be found at any time, that the Filtered Water of the plant contained a number of bacteria, largely in

excess of the usual number, as was the case of that of the Experimental Morison Mechanical Filter during the period when bacteria were propagating in the interior of the filter, it would not, probably, be necessary to devote any time to theorizing as to the cause of the occurrence, as the filters of the plant could be thoroughly cleansed by washing them with a solution of Caustic Soda and water in a short time and at a very slight expense in proportion to the total cost of operating the plant. In actual practice, however, it might be advisable to cleanse the filters at stated periods, such as practical experience might demonstrate, and not to wait for an excessive number of bacteria to appear in the Filtered Water, and it is quite likely that the process of cleansing with Caustic Soda could be improved upon by heating the solution with steam, and that as good results could be attained with a cheaper chemical compound in connection with steam. Whereas, if, for instance, a system of Natural Filter-beds, having the same capacity as above mentioned and capable of filtering at the rate of from 2,000,000 to 3,000,000 gallons per Acre per 24 hours, should meet with an experience similiar to what took place in the interior of the Experimental Natural Filters at Lawrence during the warm summer months of 1892, which is mentioned in the Massachusetts Report and which has previously been mentioned in this report, namely:—that the Filtered Water at times contained a very large number of bacteria, which in some cases equalled and even exceeded the number applied and which appeared to have had their origin in the interior of the filters and in the outlet-pipes and underdrains, it would be a very difficult matter to free the filters of the abnormal growths of bacteria, even if it could be done by artificial means, but by the expenditure of a very considerable amount of time and money, on account of the large area of the filter-beds, which would be required.

Of course, if the excessive number of bacteria mentioned above were all of a harmless species their appearance in the Filtered Water, under ordinary circumstances, would not be a matter of particular moment, although the stability of the filter-beds might be questioned until it was proved by a careful investigation that the excessive number of bacteria originated in the interior of the filters; but if there should happen to be a few cases of typhoid fever prevalent within the bound-

aries of the water-shed of the supply from which the Unfiltered Water was derived, at a time that an excessive number of bacteria was found in the Filtered Water, and there was the slightest possibility of even a portion of the dejecta of a typhoid fever patient finding its way into the supply, it would be a matter of very grave concern, as the question would naturally arise as to whether there were "breaks" in the filter-beds or if something unusual had happened to them, thereby causing an apprehension that there was a possibility of typhoid bacilli finding their way into the Filtered Water, which apprehension, if it were known that the filter-beds were in a proper condition, would not be felt. (Quite a number of epidemics of cholera and typhoid fever are known to have occurred in Europe, owing to the freezing of the whole or a portion of the surface of open Natural Filter-beds during the process of "scraping"). It is very probable, that an expert bacteriologist who was perfectly familiar with the species of bacteria that were generally found in the Unfiltered and Filtered Water of the supply under consideration as well as to the appearance of the typhoid bacillus in the water, could, after a cultivation of about two days, which is the length of time which would probably be necessary for the majority of the ordinary water bacterial colonies to become visible, detect suspicious appearing bacilli, were any such present in the samples which were being examined ; but it would very likely require, even if there were not any suspicious bacilli discovered at first, at least one week to absolutely prove that there were not any typhoid bacilli present in the samples, and a much longer time to obtain sufficient reliable data to demonstrate that the filter-beds were intact and that the excessive number of bacteria originated, if such was the case, in the interior of the filters, unless there had been similar experiences in the past that had been thoroughly investigated, which could be taken as criterions from which to theorize.

As will be seen, by inspecting the tables, the most unfavorable results were obtained with the Experimental Morison Mechanical Filter from fifteen (15) minutes to about thirty (30) minutes after water first commenced to flow from the filter. I have previously stated, that with nine exceptions, River Water was used in washing the filter. If Filtered Water had been used the entire time, instead of River Water, it is

quite probable that the "Thirty-Minute or Less" Results would have been somewhat better, and it is quite probable that more satisfactory results would have been obtained before the end of Thirty Minutes. It is simply a question, however, of the decrease or the increase of this time (30 minutes), as our experiments have positively shown that One Hour after the water commenced to flow from the filter the results were as good as they were at any time during a run of the filter. I have assumed, in working up the estimate of cost relative to waste-water, that the Filtered Water will have to be run to waste for one-half hour after water commenced to flow from the filter.

Since one of the most important points in the filtration of water is the removal of disease producing germs, the filter was tested by the application of Bacillus Prodigiosus. It would have been very dangerous to have added typhoid fever or other disease germs to the Applied Water, as the filter was located at the City's source of water supply.

It is stated in the Report of the State Board of Health of Massachusetts for the year 1892, that it was found at the Experimental Station at Lawrence, Mass., that with Bacillus Prodigiosus, more results fully as reliable and under more nearly parallel conditions could be obtained than by working with typhoid fever germs. It was further determined by a series of experiments which were made at the above-mentioned station, that the life histories of Bacillus Prodigiosus and Bacillus Typhi Abdominalis in the Merrimac River at Lawrence are quite similar.

Table No. 19 shows that the average percentage, of the Applied Bacillus Prodigiosus, that was removed from the water by filtration, was 99.8 per cent. The lowest percentage of efficiency given in the table is that of December 29, when the percentage of efficiency, given in the table, of the only sample that could be counted on that day, on account of the colonies liquefying, was 66.0 per cent. The average percentage of efficiency of the filter, if this 66.0 per cent. was not considered, would be 99.97 per cent. I am not able to offer a satisfactory explanation relative to the very large amount of Bacillus Prodigiosus found in the samples taken on December 29, as the filter, so far as could be judged by observation, was working in the usual manner on this day. The Color was of the aver-

age standard, and the half-hourly readings of the depth of water upon the filter-bed, and the quantity of water flowing into the filter, which are shown on Diagram No. 1, tend to show that the filter was working properly. It is barely possible, though not probable, that the glass tubes, in which the samples of water were collected on this day, were not sufficiently sterilized, as a great amount of work was done daily in the laboratory by the bacteriologist. The bacterial colonies in about fifty-one dishes being counted daily, and all of the sample tubes and dishes used, cleansed and sterilized.

I have mentioned, under the head of Bacteriological Work, that Cruikshank's Bacillus was added to the Applied Water on July 27, and August 17, and on October 11 and 12, at the rate of more than one million (1,000,000) per c. c., and that only upon one occasion were any traces of the same discovered, namely:—three in the sample of Filtered Water collected on July 27.

I consider the average efficiency of the Experimental Morison Mechanical Filter for removing water bacteria, from October 17 to November 11, 1893, and from January 24 to 30, 1894, at which time the filter was apparently free from growths of bacteria, as satisfactory as is generally obtained by Natural Filtration, with the best constructed sand filter-beds, at the rate of from 2,000,000 to 3,000,000 gallons per Acre per 24 hours.

It is stated in Senate Document, No. 4, of the State of Massachusetts, for 1894, that Bacteriological samples that were collected from October 13 to December 15, 1893, from the "Effluent" of the large filter that has recently been built at Lawrence, Mass., and that was put in operation September 20, 1893, and which was an outcome of investigations of the State Board of Health of Massachusetts, have given an average result of bacteria removed of 98.16 per cent.

In regard to the removal of Bacillus Prodigiosus, I consider the working of the Morison Mechanical Filter very satisfactory in this respect, with the exception of the run that was made on December 29, when the result from the only sample that could be counted on account of liquefaction was 66.0 per cent.

I have previously stated that the average percentage of

efficiency of the filter for removing Bacillus Prodigiosus without including this 66.0 per cent. was 99.97 per cent.

It will be seen by table No. 19, that the number of bacilli in the Applied Water on December 29, was 95,500. This of course is a very excessive number as well as the number which appeared in the Applied Water on a number of other days, as the average number of water bacteria that have been found in the samples of Applied Water since October 17, has been about 5,400 per c. c.

I have made a careful study of the results of all of the runs that have been made by the Morison Mechanical Filter, including those runs, given in table No. 1, in the first part of the report, making in all the results of one hundred and fifty-six (156) runs, and I have not been able to discover anything which would lead me to think that an occurrence similar to that of December 29, had taken place at any other time, and assuming that it might happen once in one hundred and fifty-six (156) times, as was the case during our experiments, the percentage of likelihood of its taking place would be $\frac{64}{100}$ of 1 per cent.

The average efficiency of the filter during the four runs when Cruikshank's Bacillus was used, that I have previously mentioned, was, for removing these bacilli, of course, 100 per cent.

Table No. 20, shows, from an average of three analyses, a reduction of *Albuminoid Ammonia by Filtration, of 70.0 per cent.*, and a reduction of *Ready-formed Ammonia of 91.0 per cent.*

It has been computed from figures given in tables, on pages from 469 to 489, of the Report of the State Board of Health of Massachusetts for the year 1892, that 58 per cent. of the Albuminoid Ammonia and 88 per cent. of the "Free Ammonia" was removed from the Applied Water by Natural Filtration at Lawrence, Mass., from June to November, with the experimental filters which are mentioned in table No. 22 of this report as having beds about five (5) feet deep.

The following table gives the proportion of Sulphur trioxide (SO_3), that was found by analysis in a sample of Pawtuxet River Water, before and after being treated with a solution of Sulphate of Alumina. The results of analyses of other waters are also given for comparison :—

From Report of Professor Thomas M. Drown, which is appended to this report.	Sulphur trioxide (SO_3) in Parts per 100,000.
Pawtuxet River Water, after being filtered through a double thickness of Swedish paper	0.5357
This filtered water after being treated with a solution of Sulphate of Alumina, in the proportion of one-half ($\frac{1}{2}$) grain of the sulphate to the gallon, and agitated for about one minute............ ...	0.8928
(The very slight flocculent precipitate produced was filtered off through a double thickness of filter-paper).	
Increase due to the addition of Alumina........	0.3571
From Report of the State Board of Health of Massachusetts for the year 1892. (Page 316).	
Normal Ground Water.	
Mansfield, well..................................	0.131
Large Population in Drainage Area.	
Stoughton, well................................	2.039
Everett, spring......	1.536
Malden, tubular wells...........................	4.184
Imperfect Natural Filtration from Unpolluted Reservoir.	
Wayland, reservoir..............	0.196
Wayland, filter-gallery.	0.136
Wells Containing Considerable Iron in Solution as the Result of Organic Matter and Iron in the Ground.	
Westborough, insane hospital, tubular wells.......	0.512
Reading, filter-gallery..........................	5.960
Bradford, Well No. 7............................	0.707
Bradford, Well No. 12...........................	0.374

From Report of the State Board of Health of Massachusetts for the year 1892. (Page 346). *Continued.*	Sulphur trioxide (SO_3) in Parts per 100,000.
Wells Near the Sea.	
Marblehead Water Company, Swampscott, large wells and tubular wells..........................	2.980
Marblehead, town supply, large well and tubular wells.....	3.060
From Transactions American Society of Civil Engineers, Vol. XXX, 1893.	
Well, near Dresden, Germany, the water of which, it is stated, is of exceptional purity	3.480
A spring, near Providence, R. I., (the water from which is extensively sold in Providence)..........	1.540

The Treasurer of the Providence Dyeing, Bleaching, and Calendering Company, of Providence, R. I., which has a Morison Mechanical Filter Plant in operation and has used Filtered Water in six tubular boilers since August 1, 1893, has furnished the following information: The estimated quantity of Alumina added to the Applied Water was at the rate of about one-half (½) grain per gallon. The six boilers of the works were inspected June 1, 1893, before the use of Filtered Water was commenced, and on December 5, 1893, after Filtered Water had been used in the boilers about four months. At this last inspection, December 5, that was made to ascertain, if possible, if the Filtered Water, that had been treated by Alumina, had affected the the boilers in any way, no scale or corrosion was detected in the pipes or boilers that could be attributed to the use of Alumina.

Sixth.—The percentage which the Color of the water would be reduced by Filtration, viz.:—

The Color of the Applied and Filtered Water was determined from standard samples ranging from 1 to 10, that were prepared by Professor J. H. Appleton, of Brown University.

Table No. 21, gives the average Color results that were obtained during the day and night as well as the percentage of Color that was removed by Filtration.

The first Color sample of Filtered Water that was collected after the filter was started, was collected one (1) minute after water commenced to flow, then five samples were collected every five (5) minutes for one-half hour, and after that every hour during the day and night.

The Applied Water samples were collected every hour during the day, and four times during the night, namely:—from 5 P.M. to 8 A.M.

The averages given in table No. 21, apply only to runs during which Basic Sulphate of Alumina was used, and as will be seen by the table, the Color observations were not commenced until the experiments had been in progress some time.

The average percentage of Color removed from June 28 to October 26, 1893, as will be seen by the table, was 81.0 per cent., and the average percentage of Color removed from October 26, 1893, to January 30, 1894, was during the day 78.0 per cent., and during the night 66.0 per cent.

The difference in the percentage of Color between the day and night samples may have been largely due to the difference in the length of time that elapsed between the time that the samples of water were collected and the time that they were compared. The samples that were collected during the day being compared very soon after they were collected, while the samples that were collected during the night, which were not compared until morning, were kept from 13 to 5 hours. A difference in the constituency of the Applied Water may also have exerted an influence, as the majority, if not the whole, of the manufactories located upon the banks of the river, that supplied the settling basin from which the Applied Water was taken, were shut down during the night, and the quantity of water flowing in the river was generally less during the night than it was during the day.

There was always a very perceivable improvement in the appearance of the water after it had passed through the filter, and I consider that the efficiency of the filter in reducing the Color of the Applied Water was very satisfactory.

From a table on page 468 of the Report of the State Board of Health of Massachusetts for the year 1892, showing the

efficiency of the experimental filters constructed in 1892, at Lawrence, Mass., for the removal of Color, by Natural Filtration, with filter-beds five (5) feet deep, after different lengths of service, it has been computed, that after 100,000,000 gallons of water had been filtered, 60 per cent. of the Color of the Applied Water was removed, and after 400,000,000 gallons had been filtered, 45 per cent.

Seventh.—The washing of the filter-bed, viz.:—

Our experiments have shown, I think, that the filter-bed could be very thoroughly washed by the aid of the mechanical rake or agitator.

Eighth.—The time which would be required for washing the filter-bed, viz.:—

The average time required for washing the filter-bed was about eleven (11) minutes.

Ninth.—The quantity of water which would be required to wash the filter-bed, viz.:—

The quantity of water required to wash the filter-bed, based on a run equivalent to a rise of four (4) feet of water in the filter after the full capacity had been reached, averaged about 4.9 per cent. of the quantity of water that was filtered during each run.

Tenth.—The quantity of water which it would be necessary to run to waste after washing the filter-bed, viz.:—

The quantity of water required for this purpose was based on the water running to waste Thirty (30) Minutes, for the reason that I have previously mentioned, and averaged about 2.9 per cent. of the quantity of water that was filtered during each run.

Eleventh.—The length of time which the filter would run after starting, before it would be necessary to shut down and wash the filter-bed, on account of the water gradually rising to its prescribed limit in the filter, on account of the filter-bed becoming gradually clogged up, viz.:—

During the runs when one-half (½) grain of Alumina and "Free Flow" were used, the average length of time that it took for the water to rise in the filter four (4) feet above the point

where it stood when the filter first commenced to discharge, at its full capacity, (128,000,000), was, since October 17, 1893, 16 hours and 43 minutes. The length of time ranged from 13 hours and 22 minutes, to 19 hours and 44 minutes. The average length of time required from April 26, 1893, to January 30, 1894, was 16 hours and 53 minutes, ranging from 6 hours and 27 minutes, to 26 hours and 53 minutes.

During the runs when three-fourths ($\frac{3}{4}$) of a grain of Sulphate of Alumina and "Free Flow" were used, since October 17, the average length of time was 15 hours and 2 minutes, ranging from 13 hours and 28 minutes, to 17 hours and 37 minutes.

Our experiments have shown that the length of time which the filter will run, does not increase in the same proportion when the water is above four (4) feet that it does when the water is below four (4) feet. The proportion from three (3) to seven (7) feet is about three-fourths ($\frac{3}{4}$) of what it is below four (4) feet, for example, considering this proportion, the average run of the filter when one-half ($\frac{1}{2}$) grain of Sulphate of Alumina and "Free Flow" were being used, for a height of six (6) feet would be approximately, $(\frac{16 \text{ h. } 43 \text{ m.}}{6 \text{ ft.} - 4 \text{ ft.}} \times .75) + 16$ h. 43 m. = 22 h. 59 m.

The condition of the water in the River, from which the Applied Water was indirectly taken, since the experiments were first commenced, has been quite varied; when it has not been in its normal condition, it has sometimes been at flood height, sometimes remarkably low, sometimes containing considerable suspended matter that has been washed into it by heavy rains from the surface of the ground, sometimes containing considerable suspended matter such as leaves, etc., that have fallen from the trees and bushes located along its banks, and sometimes it has been remarkably free from suspended matter.

The length of any of the runs of the filter did not materially change on account of the different conditions of the water in the river, with the exception that, occasionally during the summer months, after heavy rains, the length of time was reduced about one-half ($\frac{1}{2}$).

Twelfth.—The effective stability of the quartz and the supplementary precipitate bed:—whether it could be depended upon to do its work thoroughly during the time that the filter was in

operation or whether at times it would be liable to crack or break, or have its efficiency reduced in any manner, viz.:—

The number of observations that had been taken daily previous to September 6, were increased on this date for the purpose of investigating the stability of the filter-bed, and the number of bacterial samples collected daily, were also increased on November 23, for the same reason.

The height of water in the filter was observed every half-hour during the day and every hour during the night.

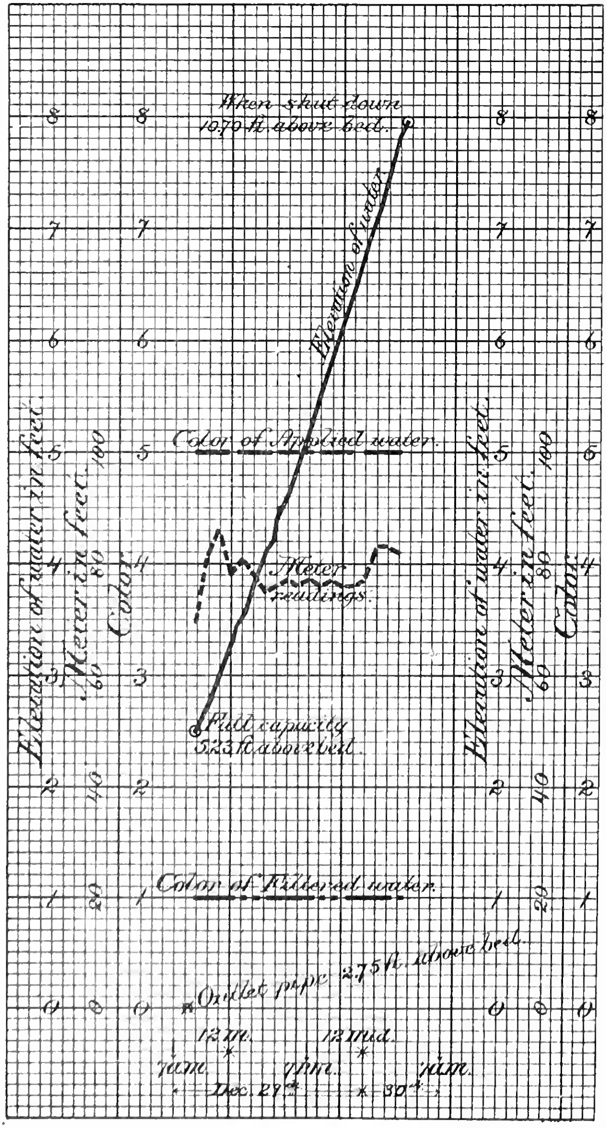
The quantity of Applied Water flowing into the filter and the color of the Filtered Water were observed every hour, day and night.

The results of ninety-two (92) runs of the filter, that were made during the time that these observations were taken, were plotted in the manner shown on Diagram No. 1.

Each result was carefully examined. If the line representing the half-hourly and hourly heights of water in the filter showed a gradual increase in proportion to the time, without any sudden break, it was considered an indication that the supplementary precipitate bed had not cracked or broken and that the quartz-bed was in good condition. If the line representing the half-hourly and hourly heights of water was abruptly broken, and the line representing the hourly quantity of Applied Water was also abruptly broken at the same time, it was considered an indication that the falling off of the elevation of the water in the filter was due to the decrease of the hourly quantity of the Applied Water, which was generally owing to some impediment having got into the meter or valve on the supply-pipe, such as a small eel or some other obstruction. The color line on the Diagram being uniform or nearly so, corroborated this supposition. If there had been a sudden break in the line representing the half-hourly and hourly heights of the water in the filter, and if the line representing the hourly quantity of Applied Water had not shown any change, and the line representing the color of the Filtered Water had suddenly shown an increase at the same time, it would have been considered as an indication that the supplementary bed had broken or that the quartz-bed had given way. There was not anything of this kind discovered, however, and a careful study of the plotted results, as well as of the hourly bacterial results, indicated that there had not any unfavorable changes taken

Diagram No. 1

Showing Elevation of the water in the filter, Hourly readings of the Meter on the supply pipe, and the Color of the Applied and Filtered water.



place in the filter-bed due to cracks or breaks, etc., with the exception, possibly, of what is shown by the bacterial results of December 29, which I have previously mentioned in detail.

The working head of the filter (the elevation of the water above the point where it stood at the time the filter first began to discharge at its full capacity), ranged, when it was shut down at the end of the different runs, from three and five-tenths (3.5) to six (6.0) feet. The bacterial and other results obtained were equally as good with the head at six (6.0) feet as they were with the head at three and five-tenths (3.5) feet.

Three samples of the quartz filter-bed, that were taken at different depths on August 18, at the end of a run of 23 hours and 19 minutes, after being treated in the manner that such samples are generally treated and cultivated two days, gave the following bacterial results:—

Approximate depth of Sample below the top of the bed, in Inches.	Number of Bacteria in One Gramme of Quartz. (Dry Weight).
$\frac{3}{4}$	364,000
2	26,054
5 to 7	2,950

The total number of bacteria that flowed into the filter with the Applied Water, during the run of 23 hours and 19 minutes, was about 23,710,000,000, assuming that the number per c. c. in the Applied Water was the same as was found in the sample of Applied Water that was collected at 12. M.

I have estimated, approximately, by the aid of the above table, that a layer of the quartz filter-bed five and one-quarter ($5\frac{1}{4}$) inches deep, extending from a point three-fourths ($\frac{3}{4}$) of an inch below the top of the bed to a point six (6) below the top, contained at the end of the run about twenty-four (24) per cent. of the total number of bacteria that had flowed into the filter in the Applied Water during the run, and that the remaining lower portion of the bed contained about three (3) per cent. of the total number. The other seventy-three (73) per cent., with the exception of about one (1) per cent. which may have gone through the filter-bed into the Filtered Water,

was probably lodged upon and in the supplementary gelatinous precipitate bed upon the top of the quartz-bed and in the upper three-fourths (¾) inch layer of the quartz-bed.

A sample of the Effluent Wash Water, collected at the end of a run of 24 hours, on August 4, immediately after the "agitator" was started, at the time that the water was removing the supplementary gelatinous precipitate bed and when it was the blackest and dirtiest, indicated that a one and one-fourth (1¼) minutes flow of this Effluent Wash Water, provided that the total number of bacteria per c. c. continued to be the same as when the sample was taken, would contain a number of bacteria equal to the total number that flowed into the filter in the Applied Water during the run, assuming that the number in the Applied Water per c. c. was the same as was found in the 12 M. sample. The indicated efficiency of the filter during this run ending August 4, was about 100 per cent.

Thirteenth.—The loss of head due to the water flowing through the filter-bed, screens, and outlet-pipe, viz.:—

The average loss of head due to the passage of the water through the supplementary precipitate bed, the quartz-bed, screens, etc., at the moment when the filter had reached a capacity of 128,000,000 gallons per Acre per 24 hours, was 2.44 feet.

From a mechanical standpoint, the working of the Experimental Morison Mechanical Filter, throughout the experiments, was very satisfactory.

I have estimated $5.69 as the cost, per 1,000,000 gallons, of operating a Morison Mechanical Filter Plant (having an effective capacity of 15,000,000 gallons per 24 hours), throughout the year.

Removal of Water Bacteria by Subsidence and Flow.

During our filtration experiments, at different times in April, May, July, August and September, 23 samples of the Pawtuxet River Water were taken at the same time (about 12 M.), that the regular samples of Applied Water were taken. It was found from these samples, after a cultivation of about 48 hours, that 40 per cent. of the bacteria was removed from the River Water before it

reached the Applied Water tap. The River Water travelled in its course to the Applied Water tap, at the rate of 9,000,000 gallons per 24 hours, through a thirty-six (36) inch pipe one hundred and fifty (150) feet long, a settling basin having a capacity of 5,850,000 gallons, a thirty (30) inch pipe one hundred and seventy-three (173) feet long, a three-sixteenths ($\frac{3}{16}$) inch mesh screen, a pump-well having a capacity of 18,000 gallons, four (4) pumps, a thirty (30) inch pipe two hundred and seventy (270) feet long, and at the rate of 14,400 gallons per 24 hours, through a two (2) inch pipe one hundred and fifty (150) feet long. Samples of the River Water and Applied Water, were also taken on June 1, hourly from 8 A. M. to 3 P. M. inclusive, for the same purpose mentioned above, and under the same conditions, and it was found that the average reduction of the River Water bacteria on this day, in its course to the Applied Water tap, was thirty-nine (39) per cent. As there were one or more springs found in the bottom of the settling basin during its construction, I should say, taking into consideration some measurements that I have made, that it is possible, though hardly probable, as the surface of the water in the settling basin was kept practically at the same height as the surface of the water in the river, that 5 per cent. of the water flowing into the basin, per 24 hours, may have flowed in through subterranean sources.

FINIS.

I have consulted in regard to the Bacteriological Work, nearly every day, while the experimental filtration work was in progress, with Dr. C. V. Chapin, Superintendent of Health, with the exception of about six weeks, when he was confined to his house by illness or was out of town. I am much indebted to Mr. George W. Fuller, in charge of the Experimental Station of the Massachusetts State Board of Health at Lawrence, Mass., for information that he has furnished me from time to time, in regard to the methods that are followed in the cultivation of bacteria at that station. I am also indebted to Professor J. H. Appleton of Brown University, Professor Charles A. Doremus of the College of the City of New York, and Professor T. M. Drown and Mrs. E. H. Richards of the Massachusetts Institute of Technology, for advice relative to some of the chemical problems that were encountered in the course of the work, and to Dr. G. T. Swarts, Medical Inspector, Professor H. C.

Ernst of the Harvard University Medical School, Professor E. K. Dunham of the Carnegie Laboratory, and Professor T. M. Prudden of Columbia College, for advice in connection with the bacteriological work.

Attention is called to the appendix of this report containing a report of Professor T. M. Drown, and a number of letters, references and tables, germane to the subject of the chemical purification of water.

Mr. James A. McKenna of the City Engineer's Department, had charge, during the experimental filtration work, of operating the different experimental filters and collecting the samples of water at Pettaconset Pumping Station.

Respectfully submitted,

EDMUND B. WESTON,

Assistant Engineer in charge of Water Department.

Appendix.

To the Report of Edmund B. Weston, C. E., upon the Results Obtained with the Experimental Filters at the Pettaconset Pumping Station, of the Providence Water Works, containing:—

Report of Professor Thomas M. Drown, upon the analysis of a sample of Pawtuxet River Water, before and after adding one-half ($\frac{1}{2}$) grain of Sulphate of Alumina.

Letters from the Hartford Steam Boiler Inspection and Insurance Co.

Letter from Dr. C. V. Chapin, giving information relative to "mechanical filtration," obtained by personal inquiries, inspection and correspondence.

Extracts from two papers, published in the Transactions of the American Society of Civil Engineers, relative to the use of Alum in the purification of water.

Extracts from an article, published in the Chemical News, relative to experiments with Alum Baking Powders, etc., etc.

Letter from Professor C. A. Doremus, relative to the action of purified waters upon boiler scale.

Letter from the Treasurer of the Providence Dyeing, Bleaching and Calendering Co., relative to experience with filtered water in boilers and wrought iron pipes.

Table giving the grains per gallon of "Alumina" and "Sulphuric Acid," which are contained in 146 Mineral Springs of the United States.

Table giving the grains per gallon of "Alumina" and "Sulphuric Acid," which are contained in some Natural Waters in Massachusetts.

Table showing the Number of Times, during 15 Winters, from 1880-81 to 1894-95 inclusive, that periods occurred (Number of days without intermission), of 1 day and More, when the Daily Mean Temperature was 32° and Less, at Providence, R. I.

Table showing the Normal Mean January Temperature in Degrees F., of a number of European cities and at Providence, R. I. Also, the Normal Mean Temperature at Providence, R. I. for December and February.

Table showing the Number of Times and the Number of Days in each Period during each Winter from 1879-80 to 1886-87 and from 1888-89 to 1892-93 that the Hope Reservoir of the Providence Water Works was Frozen Over. Also, the Date that the Reservoir was Frozen Over the First Time during each Winter and the Last Time that Ice was visible, and the Total Number of Days that the Daily Mean Temperature was 32° and Less.

Cost of Mechanical and Natural Filtration.

Report of Professor T. M. Drown.

MR. J. HERBERT SHEDD,

City Engineer,

Providence, Rhode Island.

DEAR SIR:

At your request I have made experiments to determine the effect of the addition of one-half grain of sulphate of alumina to Pawtuxet River Water, and I give you herewith the results of the investigation.

The sulphate of alumina sent me had the following composition:

	Per cent.	One-half grain contains in grains.
Insoluble residue.	0.52	0.0026
Alumina ($Al_2\,O_3$).	15.78	0.0789
Sulphuric acid ($S\,O_3$)	36.79	0.1840
Water (by difference)..	46.91	0.2345
	100.00	0.5000

The Pawtuxet River water contained, after being filtered through a double thickness of Swedish paper, the following mineral substances:

	Parts per 100,000.	Grains per gallon.
Silica..	.3833	.2238
Ferric oxide ($Fe_2\,O_3$)..............	.0567	.0331
Alumina ($Al_2\,O_3$).................	.0500	.0292
Lime ($Ca\,O$)......................	.4367	.2550
Sulphuric acid ($S\,O_3$)............	.5357	.3129

This filtered water was treated with a solution of the sulphate of alumina in the proportion of half a grain of the sulphate to the gallon, and agitated for about one minute. The very slight flocculent precipitate produced was filtered off through a double thickness of filter paper. The filtrate had the following composition:

	Parts per 100,000.	Grains per gallon.
Silica ($Si\,O_2$).	.3866	.2257
Ferric oxide ($Fe_2\,O_3$)..	.0167	.0098
Alumina ($Al_2\,O_3$).................	.1000	.0584
Lime ($Ca\,O$)............	.4433	.2588
Sulphuric acid ($S\,O_3$)	.8928	.5214

On comparing these two analyses it will be seen that silica and lime are practically the same in both, that the iron is notably less in the water which has been treated by the sulphate of alumina, and that the alumina and sulphuric acid are both considerably higher. The amounts are as follows:

	Grains per gallon.
Ferric oxide, decrease........	.0233
Alumina, increase	.0292
Sulphuric acid, increase....	.2085

The cause of the decrease of the amount of iron is the partial removal of the coloring matter of the water by the precipitated alumina. The coloring matter of brown waters is composed of organic matter and iron, and when the organic matter is removed by the mordanting power of the alumina, the iron oxide is precipitated, having nothing to keep it in solution. This is a fact which I have frequently observed in treating brown waters with alumina.

The amount of sulphuric acid in the filtered water, after treatment with sulphate of alumina, should be the amount in the sulphate in addition to that in the original river water. In the actual determinations made, the amount of sulphuric acid is slightly higher than the calculated amount, but not more than may be attributed to the limits of accuracy of the analytical processes.

	Grains per gallon.
Sulphuric acid after treatment with Sulphate of Alumina.	0.5214
Ditto, in original water......................	0.3129
Increase due to the Sulphate of Alumina.	0.2085
Amount of Sulphuric acid in one-half grain of Sulphate of Alumina..........	0.1840

The increase in the amount of alumina in the water after treatment with sulphate of alumina and filtering, is 0.0292 grain per gallon. The amount of alumina added in one-half grain of the sulphate is 0.0789 grain. This would indicate that somewhat over one-half of the sulphate was decomposed, and its alumina precipitated; the remaining portion passing into solution. Thus:

	Grains.
Amount of alumina in one-half grain of sulphate.	0.0789
Amount of alumina in one gallon of filtered river water...	0.0292
Total...........	0.1081

Amount of alumina in one gallon of water after treatment with sulphate and filtering............	0.0584
Amount of alumina precipitated......................	0.0497
Increase of alumina in water after treatment with sulphate and filtering...........................	0.0292

I do not attach any greater importance to these determinations of alumina than to show what took place in this single experiment. I am inclined to think from similar experiments which I have made from time to time, that the amount of alumina precipitated when a weakly-alkaline, natural surface-water is treated with a minute amount of sulphate of alumina is dependent on time, on the amount of agitation, and also on the degree of alkalinity of the water, which may vary from time to time. I think also that the precipitated alumina sometimes is redissolved in the water, in part at least, on long standing, particularly when the water has not been completely decolorized by the alumina. It is not safe to reason *à priori* from our knowledge of what takes place in moderately dilute saline solutions to what will take place in excessively dilute saline solutions in water containing considerable organic matter.

Under the conditions employed in this experiment the results show that there is more alumina in the water after treatment with sulphate of alumina and filtration than there was in the natural water. This increase is 0.0292 grain per gallon, which happens to be the amount present in the original water.

As to the condition in which the alumina is combined in the water, whether in its original form as sulphate, or in some other combination, it is, I think, impossible to say. The usual disposal of the acid and basic radicals among each other, as the result of an analysis of the solid residue of evaporation of a water, is largely speculative, and does not throw much light on the condition of these substances when in solution.

The increase of sulphuric acid in the water after treatment with sulphate of alumina might be a positive disadvantage when used for boilers, if the water contained sufficient lime to combine with the increased amount. In the case of the Pawtuxet River water the amount of lime is only slightly in excess of that required by the sulphuric acid naturally present in the water, so that the increase of sulphuric acid after treatment with sulphate of alumina can only form a very small amount of additional boiler scale.

From the analyses I calculate that it would require the evaporation of 5,000 gallons of water, after treatment with sulphate of alumina, to give one ounce of additional boiler scale of sulphate of lime. A boiler evaporating 10,000 gallons in 24 hours would thus accumulate a scale of one pound of sulphate of lime in eight days, over and above the amount produced by the use of untreated Pawtuxet River water.

Finally I have determined the effect on the color of the water by treatment with sulphate of alumina. I found that the use of one-half grain of the sulphate reduced the color from 0.45 to 0.18. One grain to the gallon rendered the water practically colorless, namely, 0.02, and two grains reduced the color to 0.01. These figures refer to the standards of color used by the Massachusetts State Board of Health.

THOMAS M. DROWN.

Massachusetts Institute of Technology.

Boston, July 12th, 1893.

[In the above report Professor Drown uses the term "sulphuric acid" for SO_3. He probably makes use of the term in a popular sense, as in reality SO_3 is "sulphuric anhydride" or "sulphur trioxide." The correct symbols for sulphuric acid are H_2SO_4.]

E. B. W.

Copied Letter.

HARTFORD STEAM BOILER INSPECTION AND INSURANCE CO.

HARTFORD, CONN., April 15, 1893.

Chemical Department.

Analysis No. . . .

J. M. ALLEN, ESQ., President,

Hartford Steam Boiler Inspection and Insurance Co.,
Hartford, Conn.

DEAR SIR:

Your note, with letter of Chas. V. Chapin of Providence, to you, making inquiry concerning the effect of alum treated waters on steam boilers, has just been received.

Alum, being a sulphate with an acid reaction, is much more injurious to a boiler than any of the salts ordinary found in waters that are inclined to cause corrosion: and the presence of a small excess of unchanged alum in a water will speedily cause quite serious corrosions, particularly if confidence in the improved quality of the water causes the boiler user to blow off and so change the water much less frequently than before, so that the alum solution becomes more and more concentrated.

I have met quite a number of cases where boilers are rapidly rusted by alum treated waters, even in regions of "hard" lime bearing waters, where the alum treatment is most efficacious.

In order to completely purify a water by any of the alum processes, it would appear that the alum should be very slightly in excess to insure perfect results, and it seems probable that in New England waters which often, and sometimes with quite rapid variation, contain but the slightest amount of Lime Carbonate, and of such organic matter on which an alum coagulation largely depends, the excess of alum without great care might be considerable.

However, corrosion from the use of alum is not so general as might be supposed, and I attribute this to be because either the alum is generally used in insufficient amount to entirely clear the water, or that the water either naturally contains soluble alkalies, or the rather general use at present of Soda Ash and other alkaline solvents in boilers prevents injurious action of any alum in the water.

Lime Sulphate, a product of the use of the alum process, is so appreciably soluble in water as to cause trouble from formation of hard and intractable scale, second only to the alum itself. I should not consider it safe, where alum purification is employed, to run a boiler without a sufficiency of Soda Ash or similar boiler compound, to keep the water slightly alkaline, ½ to 1 lb. per 1,000 gallons would be sufficient in New England, and would also decompose the Lime Sulphate to the manageable Carbonate. If a reddish powdery deposit (iron rust from alum corrosion) is noted, more Soda Ash should be used.

Respectfully,

GEORGE H. SEYMS, CHEMIST, (Signed)

Hartford Steam Boiler Inspection and Insurance Co.

Copied Letter.

HARTFORD STEAM BOILER INSPECTION AND INSURANCE CO.
SOUTHEASTERN DEPARTMENT,
B. F. JOHNSON, Chief Inspector,
Atlanta, Georgia, June 27, 1893.

CHAS. V. CHAPIN,
Supt. Board of Health, Providence, R. I.

DEAR SIR :

Your letter, of June 19th at hand, asking for information regarding the filtering system used by this city.

I have most of the boilers, in this city, insured and under my charge. Thus far, have been unable to find any bad effect on the iron or steel, from the alum used in purifying the water. There being no corrosion or cutting, that I considered, came from the alum.

I have been inspector for the Hartford company, nearly six years, and have had the boilers under my charge ever since.

We have only had two batteries of boilers, in this city, that have ever given us any trouble in the way of corrosion or pitting. These batteries of boilers were located in different parts or the city and were on the end of pipe lines. Very little water was used from the street mains, except, what was used at these plants and most of the corrosion and pitting was due to rust and sediment, that settled in the mains. When valves were opened up, it was carried on, through, into the boilers.

Some time ago, one of the locomotives used for shifting cars, in this city, gave way in the fire-box.

There was a statement in the papers, that it was caused by the alum used for filtering the water that cut away the stay-bolts and caused the fire-box to let go. This statement was not true. The stay-bolts were broken off, by the jar and long service. Scarcely any cutting could be found on the stay-bolts.

Respectfully yours,

B. F. JOHNSON.

Copied Letter.

HARTFORD STEAM BOILER INSPECTION AND INSURANCE CO.
Hartford, Conn., July 17, 1893.

JOHN A. COLEMAN, ESQ.,
41 Wilcox Bldg., Providence, R. I.

DEAR SIR:

The question in regard to the percentage of alum in a gallon of water that would be injurious to a boiler, was referred to the undersigned by our 2d Vice President Mr. F. B. Allen. I immediately called the attention of our Chemist to the subject and he replied that in his judgment one-half grain of alum in a gallon of water would not be injurious and would have no appreciable effect on the boiler. This report we supposed you had received, but it seems you had not. Large quantities of alum in water, particularly water that has lime in solution is not a good thing, as a resultant of the use of alum under such circumstances would be an increased amount of lime sulphate in the water, which produces a hard scale, so troublesome in some parts of New England; but one-half grain, per U. S. gallon in our judgment, would do no harm.

Truly yours,

J. M. ALLEN, PRESIDENT.

Copied Letter.

HEALTH DEPARTMENT, OFFICE SUPERINTENDENT OF HEALTH,
City Hall, Providence, June 11, 1894.

DEAR MR. WESTON:

In 1889 I visited Long Branch and examined a filter there in operation in which alum was used as a coagulent. There was no taste of alum in the water and I questioned a number of people that I met at the hotel and other places as to the presence of alum in the water and all claimed that they had never noticed it. I was referred for further information to Dr. Hunt whose statement you will find on page 43 of my report for 1889.*

I at that time wrote to the health officers of places using water

that had been treated by alum, and received answers which you will find in the Report named. Alum has also been used for some years at Newport, though somewhat irregularly, and I have repeatedly questioned Newport physicians in regard to its effect upon the users of the water, and they all say that they have never noticed any deleterious effects. During 1893 I wrote to the health officers of some forty or fifty towns using alum-treated water, and received replies from the following places: Atlanta, Ga.; Bordentown, N. J.; Chattanooga, Tenn.; Elgin, Ill.; Exeter, N. H.; Independence, Kan.; Lakewood, N. J.; Little Rock, Ark.; Macon, Ga.; Mt. Clemens, Mich.; Mt. Pleasant, Ia.; New Orleans, La.; Ottumwa, Ia.; Owego, N. Y.; Porterville, Cal.; Richfield Springs, N. Y.; St. Thomas, Ont.; Somerville, N. J.; Sidney, O.; Trenton, Mo.; Tuckhannock, Pa.; Waterloo, Ia. In no case were any ill effects attributed to the use of water which had been treated with alum and filtered. In many instances it was stated that the effluent water had been tested by competent chemists and no alum found. In one or two instances it was stated that alum had occasionally been found in the water, but the amount was small and no bad results had been noticed. I made particular inquiries at Lakewood, N. J., through a friend who was passing the winter there. He saw the best physicians and examined into the subject quite carefully, and stated it was the unanimous opinion that the filtration of water by the Hyatt process, in which alum is used as a coagulent, resulted only in its improvement.

During June of last year I visited Chattanooga and Atlanta, and had personal interviews with the health officers and other persons in both places, and their opinion as to the harmlessness of using the water was the same as that expressed in 1889. During the visit I paid particular attention to the effect of the filtered water upon boilers. At Chattanooga I visited a planing mill, an ice factory, two flour mills, and the power plant of the street railway company; and all these users of steam were emphatic in their statements that the use of the filtered water did not produce either scale or corrosion and were all highly pleased with the process of filtering because the sediment was so much less. At Atlanta, I visited, among other places, two of the largest cotton mills, a paper mill, two ice factories, and the power plant for the street railway. All the parties visited made statements similar to those made by the users of steam at Chattanooga. I saw also the boiler-makers there who do most of the repairing and they also said that it was

their opinion that filtration improved the water and that the use of alum was never the cause of corrosion. The letter which I received from the inspector of the Hartford Steam Boiler Inspection Company in Atlanta, I have already given to you.

Yours truly,

CHARLES V. CHAPIN.

* The following letters were copied from Doctor Chapin's Report for 1889:

CHILLICOTHE, MO., Nov. 2, 1889.

DR. CHAPIN, *Sup't. Health.*

DEAR SIR:

Yours of 29th received. In reply I will say that I have called upon all of the physicians of our city to ascertain if possible whether or no their attention had been called to the matter of alum in water, and as to whether there had been any complaint as to the purity of the water furnished our city. The prevailing opinion of our physicians and people is that the water furnished by the water works is far superior to any well water that we have in the city. As for myself and family, we use the water, and I have found no reason for complaint. We have made no analysis of the water, but as my attention has been called to the matter by your letter, I shall attend to the matter and give it a fair test. Undoubtedly, if alum is present in the water, it will be injurious to the extent of amount present.

Yours truly,

S. M. BEEMAN, HEALTH OFFICER.

CHATTANOOGA, TENN., Nov. 1, 1889.

DR. CHARLES V. CHAPIN, *City of Providence.*

DEAR SIR:

Yours of the 29th ultimo to hand. In regard to the influence or effect of alum in our filters, I beg leave to say that they, the filters, have been in use in this city about two years. Prior to that time we took our water straight, without filtering. Since the water company have put in their filters I have noticed no increase in the amount of sickness or in death rate in our city, but, on the con-

trary, we are improving. Our water company are using the National filter, but I do not know to what extent they use alum.

Yours respectfully,

J. L. GASTON, M. D., PRESIDENT BOARD OF HEALTH.

99 E. MITCHELL STREET, ATLANTA, GA.,
Oct. 31, 1889.

CHARLES V. CHAPIN, M. D.,

Superintendent of Health, Providence, R. I.

MY DEAR SIR:

In answer to your inquiry of the 28th instant, I will state that the Hyatt system of filtration has been in use in this city for about two years. A small portion of alum—never exceeding one grain to the gallon—is automatically injected into the water just before it enters the filters. It serves the purpose of a coagulant, and it is claimed that no part of it passes out of the filters with the clarified water. Certainly no part appreciable to the senses remains. I have used the filtered water and no other in my family constantly, and have seen no evil effects from it. In a large general practice of medicine I have never heard any complaint or observed any disorder that I could ascribe to it. The water is of crystal-like clearness, is sparkling and palatable to a grateful degree.

Yours truly,

JAMES B. BAIRD.

LONG BRANCH, N. J., Feb. 15, 1890.

DR. CHARLES V. CHAPIN.

DEAR SIR:

I have not seen or heard of any deleterious or injurious effects from the use of alum in purifying city water.

Respectfully,

S. H. HUNT.

Extracts from two papers, relative to the use of Alum in the purification of water, published in the Transactions of the American Society of Civil Engineers.

Vol. XXX., 1893. Experiences had during the Last Twenty Years with Water Works having an Underground Source of Supply. By B. Salbach, Baurath at Dresden, Saxony, Germany.

The results found at the water works built by the author for the city of Groningen, in Holland, will be of general interest.

After heavy rain storms, and during spring freshets in the river, the water is colored brown by turf bogs situated further up stream and retains its yellowish-brownish color after filtration, although otherwise clear. To remove this color, a small quantity of alum is added to it by a small pump, while on its way to the settling basins. This addition of a saturated solution of alum amounts to about 1 to 10,000 or 1 to 20,000, of water. In the settling basins the alum is speedily distributed throughout the mass of water and greatly aids its clarification. The coloring matter contained in the water, principally iron, is precipitated, and the water, after settling from 12 to 14 hours and being filtered, becomes entirely clear and without color. A chemical examination of the filtered water shows that the alum disappears from the water after clarification, and that the sulphuric acid contained in the water is increased by a minute and hardly perceptible amount. A very important result was proved by the experiments of Professor Dr. von Calcar, of Groningen, viz., that during this operation, every trace of bacterial life had vanished.

The system has been tried at this place for 13 years and may, in other like cases, be of great service.

Vol. XXI., 1889. The Vicksburg Settling Basins. By Clarence Delafield, M. Am. Soc. C. E.

Ordinarily, the water is now found clear and admirable for use, but at times, when the stain of the swamps is in solution, a small amount of either alum or perchloride of iron is found necessary to convert it into a form which can be removed by precipitation or filtration. A solution of alum is now used, which is introduced in absolute quantity from a tank connected by a pipe to the suction main of vertical pumps, thus intimately mixing it with the

entire body of water, and presenting every portion to its chemical action. The result is absolutely clear water.

The percentage of alum used is about one grain to the gallon, and it is entirely inert and harmless, even if not doing its proper duty.

These works have now been in use several months, and the water delivered to consumers is giving perfect satisfaction.

Extracts from an article published in the Chemical News of December, 1888.

EXPERIMENTS UPON ALUM BAKING-POWDERS, AND THE EFFECTS UPON DIGESTION OF THE RESIDUES LEFT THEREFROM IN BREAD. By Professor J. W. Mallet, University of Virginia.

Experiments upon the Influence on Digestion of Moderate Doses of Aluminum Hydroxide and Aluminum Phosphate Swallowed shortly before or along with Food.

Having been interested by the results of a few experiments made in my own person a year or two ago on the apparent interference with digestion of these substances, I have tried a larger number of such experiments under more carefully noted conditions and with definite quantities of the materials used, in order to test directly the physiological effect of the residues from alum baking-powders, so far as this can be determined by their action in the case of a single person.

The experiments were made with intervals of three or four days between them; the food taken was of various kinds, but always simple and wholesome, and not likely of itself to produce disturbance of digestion; there was no pre-existing derangement of the digestive functions when any experiment was undertaken; as much care as possible was taken to avoid any mere fancying of expected symptoms, and to state with moderation what was actually experienced.

While on two or three occasions, particularly with the smallest doses used, there was no clearly observable effect, the general tenor of the experiments seemed to establish beyond doubt on my part the fact that the ingestion of the aluminum compounds used produced an inhibitory effect on gastric digestion, while in some

cases, particularly with the larger doses, and on the whole rather with the hydroxide than the phosphate for equal weights of the two, the interference with the course of digestion was very notable. There was no gastric pain, nor were there any other symptoms of gastric or intestinal irritation, but simply the well-known oppressive sensations of indigestion properly so called, lasting for a longer or shorter time, but generally for at least two or three hours after the taking of food.

The quantity of aluminum hydroxide swallowed in each experiment varied from 10 to 50 grains, the average for all the experiments being about 28 grains. The quantity of aluminum phosphate used, ranged from 10 to 100 grains, the average being 45 grains. These doses were intentionally made larger than the quantities of the aluminum compounds in question derivable from such an amount of bread as would usually be eaten at a time if alum baking-powder in anything like usual proportion had been employed in making it. The object was to ascertain with what doses distinct effects were noticeable, and this seemed to be generally the case with any dose not less than 20 grains of the hydroxide or with not less than 30 or 40 grains of the phosphate. It may, of course, be reasonably supposed that a considerably less quantity than would be necessary to produce decided discomfort when once administered might prove objectionable and injurious if habitually taken as a part of the bread of each daily meal. With the proportion of alum in most of the baking-powders in use, with the allowance of two teaspoonfuls (counted as about 200 grains, though as much as 250 grains was found to be sometimes measured by a cook) of powder to a quart of flour, and assuming 35 or 40 per cent. of water in baked bread, a pound of bread would contain about 13 or 14 grains of aluminum hydroxide if alum alone were used in making the powder, or about 20 or 21 grains of aluminum phosphate if alum and calcium acid phosphate were used together, and all the aluminum were left in the bread as phosphate.

[As is given above, from 10 to 50 grains of Aluminum hydroxide, or hydrate, was swallowed in each experiment, and that no distinct effects were noticeable with doses less than 20 grains. Also, that from 13 to 14 are generally contained in the amount of baking-powder, containing alum, used with a quart of flour.

It is shown on page 43 that one-half (½) grain of Sulphate of Alumina, the average amount added per gallon to the water during the experiments with the Morison Mechanical Filter, contains

only about 0.08 of a grain of Alumina (Al_2O_3). The result of the addition of the one-half (½) grain of Sulphate of Alumina to the water, so far as Aluminum Compounds are concerned, was the formation of about 0.12 of a grain of Aluminum Hydroxide, or Hydrate ($Al_2H_6O_6$), which was precipitated upon the filter-bed, and retained within the filter, with the exception of a minute portion that came through the filter-bed with the water that was being filtered, which caused the discoloration produced by the Logwood and Acetic Acid test, in the Filtered Water.]—E. B. W.

Copied Letter.

CHEMICAL LABORATORY OF BELLEVUE HOSPITAL MEDICAL COLLEGE, EAST 26TH STREET.

NEW YORK, June 16th, 1894.

MR. E. B. WESTON.

DEAR SIR:

Water such as you have in Providence and we in N. Y., which holds organic matter in suspension and a small quantity of lime in solution, forms a scale at times, consisting largely of floating impurities baked on the boiler shell and partly cemented there with the lime. When all suspended matter is removed by filtration, no new scale forms, and the old disintegrates gradually. Engineers frequently use rain water for a time in boilers to loosen scale on this principle. There is scarcely enough lime in Providence water to form scale of itself, even though calcium sulphate is practically insoluble at 3 atmospheres steam pressure. Below this what calcium sulphate there is in Providence water after filtration should remain dissolved, since its coefficient of solubility is such that unless the water were greatly concentrated by evaporation the saturation point would not be reached.

Even under high pressures, it would require the evaporation of many thousand gallons of water for even a thin coating of calcium sulphate to appear in a boiler.

Yours very truly,

CHARLES A. DOREMUS.

Copied Letter.

PROVIDENCE DYEING, BLEACHING AND CALENDERING CO.
(Founded 1814.)

P. O. Box, 1131.
Telephone, 1708.

52 VALLEY STREET, PROVIDENCE, July 18, 1894.

MR. E. B. WESTON.

DEAR SIR:

Our battery of six boilers was examined on Dec. 3d, 1893, by F. D. Terry, Inspector for the Hartford Steam Boiler Insurance Co. This was six months after we commenced to feed the boilers with filtered water that had Sulphate of Alumina added to it at the average rate of ½ gr. per gallon. There was nothing discovered during this examination of the boilers which indicated any injurious effects from the use of the filtered water.

When we first began to use the filtered water, a scale or deposit which our wrought iron pipes contained was acted upon and gradually removed by the purified water flowing through them. In consequence of this the water was at times very dirty until the scale was entirely removed, which took, with our somewhat irregular use of different pipes, some two weeks or more. Since then we have had no trouble with the old pipes, and we have never had any trouble with the new pipe.

Yours truly,

JOHN P. FARNSWORTH, TREAS.

The boilers referred to above were examined by the City Inspector on the 30th of May last, and were found in practically the same state as reported above.

Table A.

The following table gives the grains per gallon of Alumina or Aluminum Oxide and Sulphuric Acid or Sulphuric Oxide which are contained in the waters of 146 Mineral Springs of the United States. The table was compiled from "Lists and Analyses of the Mineral Springs of the United States," published in Bulletin No. 32 of the United States Geological Survey. It embraces all of the results which are given in the bulletin relative to the constituents above mentioned, when quantities are given, in cases in which the springs are considered as "resorts" or their waters used commercially.

Name of Springs and State in which they are Located.	Remarks.	Grains per Gallon.	
		Alumina.	Sulphuric Acid.
Maine.			
Poland Silica Springs	Used commercially and as a resort.		
Star Spring		0.32	
Rosiernciau Spring	Do.	0.03	
Hartford Cold Spring	Do.	0.24	
New Hampshire.			
Birchdale Springs	Do.		
Concord Spring		0.12	
Unity Springs	Resort.		
Iron Spring		0.04	
Vermont.			
Guilford Mineral Springs	Used commercially and as a resort.		0.69
Middletown Springs	Do.		
Spring No. 1		0.10	
Sheldon Spring	Do.		0.51

TABLE A.—CONTINUED.

NAME OF SPRINGS AND STATE IN WHICH THEY ARE LOCATED.	REMARKS.	GRAINS PER GALLON.	
		Alumina.	Sulphuric Acid.
NEW YORK.			
Ballston Spa Springs	Resort.		
Artesian Lithia Spring	Used commercially.	0.08	
Washington Lithia Well	Do.	0.40	
Chittenango Springs	Resort.		
White Sulphur Spring		0.08	
Cave Spring		0.22	
Crystal Springs	Resort.		0.58
Lebanon Thermal Spring	Used commercially and as a resort.	0.45	
Oak Orchard Acid Springs			
Spring No. 1	Used commercially.	(6.51)	134.73
Spring No. 2	Do.		129.06
Oak Orchard Acid Water	Do.	(1.92)	133.31
Richfield Springs	Resort.		
Sulphur Spring		0.10	
Saratoga Springs	Do.		
Champion Spouting Spring	Used commercially	0.46	
Congress Spring	Do.	0.32	
Empire Spring	Do.	0.42	
Hathorn Spring	Do.	0.13	
High Rock Spring	Do.	1.22	
New Putnam Spring	Do.	0.22	
Union Spring	Do.	0.32	
Vichy Spring	Do.	0.48	

NEW JERSEY.			
Schooley's Mountain Spring	Resort.	0.14	
PENNSYLVANIA.			
Cresson Springs	Do.		
Magnesia Spring		0.01	
Gettysburg Lithia Spring	Used commercially.	0.02	
Guylyck and Gaylord's Spring	Do.	(0.17)	3.10
Blossburg Springs	Has considerable local reputation.	(1.97)	5.64
MARYLAND.			
Strontia Mineral Spring	Used commercially.	1.09	
Flint Stone Mineral Springs	Used locally		71.68
VIRGINIA.			
Bath Alum Springs	Used commercially and as a resort.		
Spring No. 1		10.29	5.81
Spring No. 2		(9.00)	2.88
Spring No. 3		12.29	7.88
Clifton Springs	Resort.		
Spring No. 1		0.08	0.72
Spring No. 2			2.24
Blue Ridge Springs	Used commercially and as a resort.	0.14	
Farmville Lithia Springs			
Spring No. 2	Used commercially.	2.52	
Jordan Alum Springs	Resort.		
Chalybeate Spring		0.05	
Alum Spring		(7.61)	23.64
Spring No. 2		(3.36)	2.07
Spring No. 3		(2.06)	2.14
Spring No. 4		(24.32)	1.81

TABLE A.—CONTINUED.

Name of Springs and State in which they are Located.	Remarks.	Grains per Gallon. Alumina.	Grains per Gallon. Sulphuric Acid.
VIRGINIA.—Continued.			
Spring No. 5		(7.83)	7.90
Spring No. 6		(8.36)	5.32
Jordan's White Sulphur Springs	Used commercially and as a resort.	0.01	
Kimberling Springs	Local resort.		
Red Sulphur Spring			0.17
Massanetta Mineral Springs	Used commercially and as a resort	0.16	
Pulaski Alum Springs	Do.	(6.48)	(1.98)
Rawley Springs	Do.		
Main Fountain		0.04	0.43
Orkney Springs	Resort.		
Bear Wallow Spring		0.01	0.36
Rockbridge Alum Springs	Used commercially and as a resort		
Chalybeate Spring		0.06	
Spring No. 1		14.76	18.79
Spring No. 2		17.91	15.22
Spring No. 3		43.95	2.04
Spring No. 4		24.09	5.51
Spring No. 5		(3.36)	2.07
Spring No. 6		(2.06)	2.14
Spring No. 7		(24.32)	4.84
Spring No. 8		(7.83)	7.90
Spring No. 9		(8.36)	5.32
Stribling or Augusta Springs	Used commercially and as a resort		
Alum Spring			9.09

No. 4 Alum Spring		(5.01)	5.05
No. 5 Alum Spring		(5.39)	9.82
No. 6 Alum Spring		(11.52)	6.54
Rock Enon Springs	Used commercially and as a resort	0.80	
Roanoke Red Sulphur Springs	Resort	0.01	
Shenandoah Alum Springs	Used commercially and as a resort	10.29	49.42
Variety Springs	Resort		
Alum Spring		(10.32)	1.37
Wallawhatoola Alum Springs		(21.63)	33.82
WEST VIRGINIA.			
Capon Springs	Used commercially and as a resort		
Main Spring		0.02	
Beauty Spring		0.02	
Greenbrier White Sulphur Springs	Do.		
Sour Spring		37.42	112.80
Salt Sulphur Springs	Do.		
Iodine Spring		0.18	
NORTH CAROLINA.			
Alum Spring of Onslow County	Resort		0.25
Cowhead Spring	Do.		1.23
Panacea Spring near Littleton	Used commercially and as a resort	0.32	0.43
Park's Alkaline Mineral Spring	Do.	3.50	
GEORGIA.			
Catoosa Springs	Resort and is beginning to be used commercially to some extent.		
No. 4 Chalybeate Spring		(0.20)	0.01
No. 3 Cosmetic Spring		(0.71)	0.01
No. 5 Magnesia Spring		(0.21)	0.01

TABLE A.—CONTINUED.

Name of Springs and State in which they are Located.	Remarks.	Grains per Gallon. Alumina.	Grains per Gallon. Sulphuric Acid.
GEORGIA.—Continued.			
No. 6 Congress Spring		(0.16)	0.01
No. 7 Alum Spring		(0.33)	0.01
No. 8 Black Sulphur Spring		(0.43)	0.12
No. 9 White Sulphur Spring		(0.74)	0.12‡
No. 10 Buffalo Spring		(0.71)	0.13‡
ALABAMA.			
Talladega Sulphur Spring	Resort.	1.45	315.85*
Roper Mineral Wells	Used commercially.		
Johnston's Wells	Used locally	12.41†	39.45*
TENNESSEE.			
Austin's Springs	Resort.	2.00†	
Galbraith's Springs	Do.	0.04†	
Hurricane Springs	Sold to limited extent and a resort	0.29†	
Montvale Springs	Resort.	0.50†	
KENTUCKY.			
Kuttawa Mineral Springs	Has local reputation	70.08	
TEXAS.			
Kendall County Mineral Springs	Resort.		67.25
Mineral Well, Palo Pinto County	Used as a resort and to some extent commercially.	1.54†	
Sour Lake Mineral Springs	Used commercially and as a resort		

Spring No. 7		(13.66)	16.67
Spring No. 9		(9.38)	6.18
Sour Springs, Caldwell County	Do.		7.26
Wootan Wells	Do.		
Well No. 4			86.41
OHIO.			
Green Mineral Spring	Used commercially and as a resort	0.98	
Ohio Magnetic Spring	Do.	0.12	
INDIANA.			
Greencastle Springs	Resort.		
Daggy Spring		0.16	
Dew Drop Spring		0.07	
West Saratoga Springs	Used commercially and as a resort		
Spring No. 1		0.18	7.26
Spring No. 2		0.36	3.20
Saint Ronan's Well	Resort.		245.80
ILLINOIS.			
Alcyone Mineral Springs	Used commercially	1.65	
Glen Flora Springs	Used commercially and as a resort	0.15	
MICHIGAN.			
Butterworth's Magnetic Spring	Resort.	0.41	
Grand Haven Mineral Spring	Do.	0.30	
Mount Clemens Mineral Springs	Used commercially		
Mineral Well		29.47	
Medea Spring		29.00	
Soolbad Spring		11.21	

† Aluminum Oxide. ‡ Sulphuric Acid (free). * Sulphuric Oxide.

TABLE A.—CONCLUDED.

Name of Springs and State in which they are Located.	Remarks.	Grains per Gallon. Alumina.	Grains per Gallon. Sulphuric Acid.
Wisconsin.			
Arctic Springs	Resort	0.15†	
Bethesda Spring, Waukesha	Used commercially and as a resort	0.12†	
Gihon Springs	Do.	7.59†	
Glenn Springs	Do.	0.05†	
Hacket's Spring	Unimproved, used locally	0.11†	
Horeb Mineral Spring	Used commercially and as a resort	0.23†	
Iodo-Magnesian Springs	Resort	0.06†	
Shealtiel Mineral Springs	Used commercially and as a resort	0.09†	
Sheboygan Mineral Spring, (artesian)	Used commercially	1.10†	
Sheridan Springs	Resort to small extent	0.05†	
Vesta Spring	Used commercially	0.13†	
White Rock Spring	Do.	0.62†	
Minnesota.			
Owatonna Mineral Springs	Resort		
Vichy Spring		0.10	
Name unknown		0.28	
Iowa.			
Cherokee Magnetic Mineral Springs	Used commercially and as a resort	0.29	
Chamberlain Mineral Springs	Local resort		25.02
Missouri.			
Bowsher Mineral Spring	Resort	0.65†	
Climax Springs	Do.		3.60

Landreth's Mineral Well	Do.	0.67†	
Sweet Springs, Brownville	Used commercially and as a resort		
Akesion Spring		0.17†	
Sweet Spring		0.09†	
KANSAS.			
Manhattan Artesian Mineral Wells	Used commercially and as a resort		
Well No. 1			61.36
Well No. 2			33.11
CALIFORNIA.			
Litton's Seltzer Springs	Used commercially and as a resort		2.36
Highland Springs	Resort		
Seltzer Spring		1.56	
Dutch Spring		0.11	
Magic Spring		0.17	
Tolenas Springs	Used commercially and as a local resort	0.96	
WASHINGTON.			
Medical Lake	Used commercially and as a resort	0.18†	

† Aluminum Oxide.

In some of the analyses given in the bulletin, the term "Alumina" is used and in others Aluminum Oxide. As these terms are identical in chemistry, I have placed the figures representing them in one column, headed "Alumina," but have indicated by daggers (†) those which are given in the analyses as Aluminum Oxide instead of "Alumina." It is quite probable, I think, that in many of the analyses given in the bulletin that the term "Sulphuric Acid" may have been used in a popular sense for Sulphur Trioxide or Sulphuric Oxide, which are identical. There are not any means of positively determining this from the bulletin, however, and I have, therefore, placed the figures representing them in one column

headed "Sulphuric Acid," signifying by asterisks (*) and double daggers (‡) when the terms used in the analyses were not "Sulphuric Acid." The figures in parentheses in the column headed "Alumina," opposite to the figures representing "Sulphuric Acid," were estimated from figures representing Aluminum Sulphates, which I have assumed to be $Al_2 3 (SO_4)$. Other figures representing Aluminum Sulphate, given in the analyses in the bulletin, were not considered in compiling the table.

The results given in the bulletin relating to Hot or Warm Springs, are not included in the above table.

[As I have mentioned, in the main body of my report, about 0.5 of a grain of Basic Sulphate of Alumina was added to each gallon of Pawtuxet River Water during the experiments with the Experimental Morison Mechanical Filter, in order to purify it satisfactorily. It is shown on page 39 and in Professor Drown's report in the appendix, that 0.5 of a grain of a sample of Basic Sulphate of Alumina contained about *0.08 of a grain of Alumina* ($Al_2 O_3$) and about 0.18 of a grain of Sulphur Trioxide (SO_3). It is also shown in Professor Drown's report that a sample of Pawtuxet River Water contained per gallon, after filtration through paper, about 0.03 of a grain of Alumina ($Al_2 O_3$) and about 0.31 of a grain of Sulphur Trioxide (SO_3) (about 72 per cent. more than the sample of Basic Sulphate of Alumina contained), and that after adding 0.5 of a grain of Basic Sulphate of Alumina, per gallon, to the River Water and filtering through paper, the effluent water showed an increase in Alumina ($Al_2 O_3$) corresponding to the same quantity that was found in the River Water, and an increase of Sulphur Trioxide (SO_3) which corresponds to an amount about 33 per cent. less than was found in the River Water. I have quoted Professor Drown's report in making the above comparison, as Professor Appleton's analyses and our own tests indicate that there did not any of the Basic Sulphate of Alumina, that was added to the Applied Water, pass through the filter in its original state.]—E. B. W.

TABLE B.

The following table gives the quantity of "Alumina" and "Sulphuric Acid" contained in some Natural Waters in Massachusetts, compiled from the Report of the State Board of Health of Massachusetts for the year 1892. (The proportions of "Sulphuric Acid" in the table have been previously given in parts per 100,000 in the main portion of my report).

REMARKS.	GRAINS PER GALLON.	
	"Alumina." (Al_2O_3).	"Sulphuric Acid." (SO_3).
Normal Ground Waters.		
Mansfield, Well	0.01	0.08
Large Population on Drainage Area.		
Stoughton, Well	0.03	1.19
Everett, Spring	0.02	0.90
Malden, Tubular Wells	0.01	2.44
Improved Natural Filtration from Unpolluted Reservoir.		
Wayland, Reservoir	0.02	0.11
Wayland, Filter Gallery	0.03	0.08
Wells Containing Considerable Iron in Solution, as the Result of Organic Matter and Iron in the Ground.		
Westborough, Insane Hospital, Tubular Wells	0.01	0.30
Reading, Filter Gallery	0.03	3.48
Bradford, Well No. 7	0.01	0.41
Bradford, Well No. 12	0.01	0.22
Wells Near the Sea.		
Marblehead Water Company, Swampscott, Large Wells and Tubular Wells	0.01	1.74
Marblehead, Town Supply, Large Wells and Tubular Wells	0.01	1.79

Table C.

Showing the Number of Times, during 15 Winters, from 1880-81 to 1894-95 inclusive, that Periods occurred (Number of days without intermission), of 1 day and More, when the Daily Mean Temperature was 32° and Less, at Providence, R. I.

88	Periods of	1 day each.
59	Periods of	2 days each.
47	Periods of	3 days each.
21	Periods of	4 days each.
19	Periods of	5 days each.
13	Periods of	6 days each.
8	Periods of	7 days each.
5	Periods of	8 days each.
6	Periods of	9 days each.
2	Periods of	10 days each.
2	Periods of	11 days each.
4	Periods of	12 days each.
1	Period of	13 days.
1	Period of	14 days.
1	Period of	16 days.
1	Period of	17 days.
1	Period of	19 days.
1	Period of	22 days.

TABLE D.

Showing the Normal Mean January Temperature in Degrees F., of a number of European cities and at Providence, R. I. Also, the Normal Mean Temperature at Providence, R. I., for December and February.

NAMES OF CITIES.	December.	January.	February.
St. Petersburg	....	16°	
Warsaw	....	24°	
Königsberg	....	26°	
Providence, R. I	32.9°	27.5°	29.1°
Zurich	....	29°	
Budapest	....	29°	
Posen	....	29°	
Frankfort-on-Oder	....	30°	
Berlin	....	31°	
Hamburg	....	31°	
Altona	....	31°	
Magdeburg	....	31°	
Bremen	....	32°	
London	....	38.5°	

TABLE E.

Showing the Number of Times and the Number of Days in each Period during each Winter from 1879-80 to 1886-87 and from 1888-89 to 1892-93, that the Hope Reservoir of the Providence Water Works was Frozen Over. Also, the Date that the Reservoir was Frozen Over the First Time during each Winter, and the Last Time that Ice was visible, and the Total Number of Days that the Daily Mean Temperature was 32° and Less.

Winter.	First Froze Over.	Last Ice Visible.	No. of Days in Each Period. 1st Time.	2d Time.	3d Time.	4th Time.	5th Time.	Total No. of Days.	Per cent. of Days Froze Over from First to Last.	Remarks.	No. of Days that Mean Temperature was 32° and Less.
1879–80	Dec. 23	Feb. 18	39	13	..	..	..	52	91	....	..
1880–81	Nov. 28	March 18	1	106	..	..	..	107	96	....	87
1881–82	Jan. 5	March 10	64	..	..	..	..	64	100	....	52
1882–83	Dec. 4	March 29	2	110	..	..	..	112	97	....	98
1883–84	Dec. 16	March 24	99	..	..	..	..	99	100	....	73
1884–85	Dec. 20	April 1	3	8	4	71	..	86	84	....	84
1885–86	Dec. 27	March 22	9	73	..	..	..	82	96	....	67
1886–87	Dec. 8	March 13	95	..	..	..	..	95	100	....	74
1887–88	......	....	..	..	..	..	..	..	..	Filling Reservoir.	72
1888–89	Dec. 15	March 4	2	17	5	1	28	53	67	....	51
1889–90	Jan. 17	March 13	3	13	4	9	..	29	53	....	39
1890–91	Dec. 8	Feb. 26	80	..	..	..	..	80	100	....	62
1891–92	Jan. 8	March 27	6	2	51	12	..	71	90	....	58
1892–93	Dec. 11	March 30	1	99	..	..	..	100	92	....	73
Averages.	Dec. 20	March 16	..	..	..	..	..	79	90	....	68

Cost of Filtration.

December 20, 1895.—The following estimates have been added to the appendix at the request of the Secretary of the State Board of Health, of Rhode Island :

Mechanical Filtration.—Estimates Nos. 1, 2, 3 and 4.

Estimates of the cost of four first-class Mechanical Filter Plants having an effective capacity each of 15,000,000 gallons per 24 hours, and the cost of operating the same when Basic Sulphate of Alumina (@ \$0.02 per pound), is used, at the rate of $\frac{6}{10}$ of a grain per gallon of water filtered.

Each plant includes :—A Brick building, for housing filters and auxiliaries, having an iron roof and concrete floor, including smoke stack, flues, stairs, galleries and ladders,—A Wooden storage shed,—Cast-iron pipes and connections,—Gates and angle valves and wheel stands and wheels,—Centrifugal pumps, in duplicate,—Steam engines, in duplicate,—Boilers, in duplicate,—Boiler feed pumps and heater,—Electric lighting and signalling work,—Steam heating pipes, etc.,—Plumbing,—Chemical apparatus and connections,—Equipment of engine room,—Application of power, —Filters,—etc., etc.

Estimate No. 1.

Plant having *60 Steel Filters*, and based upon an average rate of filtration, when the entire number of filters are in service, of 100,000,000 gallons per Acre per 24 hours, as recommended in the report.

An actual rate of about 100,000,000 gallons would have required 58 filters, but as it was decided to arrange the filters in batteries of 3, there would have been 19 complete batteries and 1 odd filter. It was, therefore, thought best to add 2 more filters in order to have 20 complete batteries, and to be on the safe side in regard to a future increase of the consumption of water by the city. Assuming that 3 filters would be out of service the entire time on account of being washed, the remaing 57 would be obliged to filter 15,000,000 gallons per 24 hours, in addition to 735,000 gallons, the quantity required for washing the filters, and the average rate of filtration through the 57 filters while filtering 15,735,000, would be about 106,000,000 gallons per Acre per 24 hours. The reduction

of the rate of filtration from 128,000,000, the average rate during the experiments, to 100,000,000 was not recommended for the purpose of obtaining purer water than could be procured at a rate of 128,000,000; but in order to have a sufficient reserve for washing the filters, and to enable the filters to be run a longer time between washings than 16h. 43m., the average length of time during the experiments (which could be brought about by reducing the rate of filtration), as it was thought that an increased length of time between washings might possibly be of advantage in the handling of a plant which would have a capacity many times larger than the experimental filter,—also, to assure beyond a possible doubt, if unforeseen difficulties should be encountered in the future, of the practical working of the filter plant and a positive delivery of 15,000,000 gallons of purified water per 24 hours, in addition to the quantity required for washing the filters, at a rate of filtration not to exceed under any circumstances, 128,000,000 gallons per Acre per 24 hours.

In the report I have given $5.69 as the cost per 1,000,000 gallons of operating a 15,000,000 Mechanical Filter Plant, including the cost of cleansing the filters twice a year with Caustic Soda. I have also mentioned in the report that I thought that the expense of cleansing the filters could be considerably reduced by the use of steam and other chemicals. Since 1893 I have made some careful investigations relative to cleansing large filters in practical operation, and I have found that the cost of cleansing can be very much reduced, from what it can be done for by using Caustic Soda, by the use of Soda Ash and Steam. In Estimates Nos. 1, 2, 3 and 4, I have, therefore, taken this reduction of cost into consideration, in addition to the use of unfiltered water as "rewash water" instead of filtered water, which reduces the cost of operating from $5.69 to $4.52.

Total Cost of filter plant $215,172,—interest on total cost, per annum @ 4 per cent., $9807,—annual deterioration of plant and repairs $7134,—cost considering the above figures $3.15 per 1,000,000 gallons filtered,—cost of operating, including cost of cleansing filters twice a year with "soda ash" and steam, $4.52 per 1,000,000 gallons.—*Total cost of filtration, $7.67 per 1,000,000 gallons.* (If 2 per cent. for a sinking fund was considered, instead of "deterioration," the total cost per 1,000,000 gallons would be $7.48).

Estimate No. 2.

Plant having *60 Seasoned Cypress Wood Filters.* The other conditions are the same as in Estimate No. 1.

Total Cost of filter plant $229,452,—interest on total cost, per annum @ 4 per cent., $9178,—annual deterioration of plant and repairs, $9132,—cost considering the above figures, $3.34 per 1,000,000 gallons filtered,—cost of operating, including cost of cleansing filters twice a year with "soda ash" and steam, $4.52 per 1,000,000 gallons.—*Total cost of filtration, $7.86 per 1,000,000 gallons.* (If 2 per cent. for a sinking fund was considered, instead of "deterioration," the total cost per 1,000,000 gallons would be $7.28).

Estimate No. 3.

Plant having *51 Steel Filters*, and based upon an average rate of filtration, through 48 of the 51 filters, of about 126,000,000 gallons per Acre per 24 hours (the average rate during the experiments being 128,000,000), while 48 of the filters are delivering an average quantity of 15,000,000 gallons per 24 hours, in addition to 735,000 gallons, the amount required for washing the filters.—It is assumed that the other 3 filters will always be out of service on account of being washed, etc. The average rate of filtration through the entire number of 51 filters, if they were all in service at the same time, while delivering an average quantity of 15,735,000 gallons per 24 hours, would be about 119,000,000 gallons per Acre per 24 hours.

Total Cost of filter plant $212,404,—interest on total cost, per annum @ 4 per cent., $8496,—annual deterioration of plant and repairs, $6445,—cost considering the above figures, $2.73 per 1,000,000 gallons filtered,—cost of operating, including cost of cleansing filters twice a year with "soda ash" and steam, $4.52 per 1,000,000 gallons.—*Total cost of filtration, $7.25 per 1,000,000 gallons.* (If 2 per cent. for a sinking fund was considered, instead of "deterioration," the total cost per 1,000,000 gallons would be $7.08).

Estimate No. 4.

Plant having *51 Seasoned Cypress Wood Filters.* The other conditions are the same as in Estimate No. 3.

Total Cost of filter plant $198,934,—interest on total cost, per

annum @ 4 per cent., $7957,—annual deterioration of plant and repairs, $7888,—cost considering the above figures, $2.89 per 1,000,-000 gallons filtered,—cost of operating, including cost of cleansing filters twice a year with "soda ash" and steam, $4.52 per 1,000,000 gallons.—*Total cost of filtration, $7.41 per 1,000,000 gallons.* (If 2 per cent. for a sinking fund was considered, instead of "deterioration," the total cost per 1,000,000 gallons would be $6.91).

The cost of the filter plants considered in estimates Nos. 1, 2, 3 and 4, were based on actual figures given in a proposition for furnishing and constructing a large filter plant in 1893.

Natural Filtration.—Estimates Nos. 5, 6, 7 and 8.

On page 655 of the Report of the State Board of Health of Massachusetts, for the year 1894, may be found the following:

"*More Satisfactory Results from Covered Filters, in a Climate*" "*as exists at Lawrence.*"

"From experience with the out-door experimental Filters, No." "3 B and 8 A, and the Lawrence city filter it appears that the" "difficulty in scraping the surface during the winter months is" "so great that it is advisable to provide water filters with covers" "in this climate."

On April 18, 1895, the Water Board of Lawrence, Massachusetts, received a communication from the designer of the Two and One-half (2½) Acre Natural Filter-bed at Lawrence which first went into operation in September, 1893, recommending the covering of the filter-bed. Soon after, the Water Board requested the City Engineer of Lawrence to make plans to cover the bed. On June 28, plans were submitted to the Board, the estimated cost of which was $10,000. The covering which was designed for the filter-bed was to be of wood, with a roof to be covered with two-inch plank, with skylights, and sheathing inside, to make an air space to assist in preventing freezing.

The Total Cost charged to the construction of the Lawrence Filter, to January 1, 1894, was $69,531.74.—The Cost for Maintenance, labor and care of the Filter, during the year 1894, was $4614.50, and the Total Quantity pumped from the Filter during the year was 1,049,938,320 gallons. The Cost of Filtration, etc., per 1,000,000 gallons, during the year 1894, therefore, was $4.39.

From "The Filtration of Public Water-supplies, by Allen" "Hazen, Late Chemist in charge of the Lawrence Experiment" "Station of the Massachusetts State Board of Health," published in 1894, the following extracts relative to "Covers for Filters," have been taken:

"An addition to the Berlin filters, built in 1874, was covered" "with masonry vaulting, over which several feet of earth were" "placed, affording a complete protection against frost. The filters" "at Magdeburg built two years later were covered in the same way," "and since that time covered filters have been built at perhaps a" "dozen different places."

"Roofs have been used in Königsberg, Posen, and Budapest" "instead of the masonry vaulting. They are cheaper, but do not" "afford as good protection against frost, and even with great care" "some ice will form under them."

"To supply a maximum of 10,000,000 gallons daily, five filters" "each with an area of one acre will be ample. Any four of them" "can easily furnish this quantity while the fifth is out of use for" "cleaning or other cause. If the city is north of the line of nor-" "mal January temperature of 32°, vaulted filters will be required."
* * *

"Some estimates recently made by the author in connection" "with engineers examining the Boston Metropolitan Water-sup-" "ply indicate that filters fully up to the German standards, but" "with beds of a full acre each, and with vaulting substantially" "like that successfully used on the Newton covered reservoir," "can be built at present American prices for somewhat less than" "the cost given above, notwithstanding the higher price paid for" "American labor."

"Including the connection with the (existing) pumping-station" "we may estimate the cost of our five acres at \$350,000, with a" "probability that with favorable local conditions the expenditure" "would be still less."

Estimate No. 5.

Filter-beds *Covered with Masonry Vaulting*, based upon Mr. Hazen's figures given above. $15,000,000 \div 10,000,000 = 1.5$,— $1.5 \times$ \$350,000 = \$525,000 as the Total Cost of the Filter-beds,—interest

on total cost, per annum @ 4 per cent., $21,000,—deterioration and repairs, per annum, $3,500,—cost considering these figures, $4.47 per 1,000,000 gallons,—assumed cost of operating the filters, $4.39 per 1,000,000 gallons (the same as the cost at Lawrence for the year 1894).—*Total cost of filtration, $8.86 per 1,000,000 gallons.* (If 2 per cent. for a sinking fund was considered, instead of "deterioration," the total cost per 1,000,000 gallons would be $10.30).

Estimate No. 6.

Filter-beds *Covered with Wood*, based upon the figures given above relating to the two and one-half (2.5) acre filter-bed at Lawrence, Mass., and assuming the rate of filtration 2,000,000 gallons per Acre per 24 hours, should all of the beds be in service at the same time, and 2,500,000 when four-fifths ($\frac{4}{5}$) of the beds are in service, and one-fifth ($\frac{1}{5}$) out of use for cleaning or other cause. $69,532 ÷ 2.5 = $27,813, cost of beds per acre,—$40,000 ÷ 2.5 = $16,000, cost of covering with wood per acre,—15,000,000 ÷ 2,000,000 = 7.5,—cost of beds $27,813 × 7.5 = $208,598,—cost of covering with wood, $16,000 × 7.5 = $120,000,— Total Cost of filter-beds $208,598 + $120,000 = $328,598,—interest on total cost, per annum @ 4 per cent., $13,144,—deterioration and repairs per annum, $7391,—cost considering these figures, $3.75 per 1,000,000 gallons,—assumed cost of operating the filters, $4.39 per 1,000,000 gallons (the same as the cost at Lawrence for the year 1894).—*Total cost of filtration, $8.14 per 1,000,000 gallons.* (If 2 per cent. for a sinking fund was considered, instead of "deterioration," the total cost per 1,000,000 gallons would be $8.05).

Estimate No. 7.

Conditions the same as in Estimate No. 6, with the exception that the rate of filtration is assumed to be 2,500,000 gallons per Acre per 24 hours, should all of the beds be in service at the same time, and 3,125,000 when four-fifths ($\frac{4}{5}$) of the beds are in service, and one-fifth ($\frac{1}{5}$) out of service for cleaning or other cause. 15,000,000 ÷ 2,500,000 = 6,—cost of beds $27,813 × 6 = $166,878,—cost of covering with wood, $96,000,—Total Cost of filter-beds $166,878 + $96,000 = $262,878,—interest on total cost, per annum @ 4 per cent., $10,515,—deterioration and repairs per annum, $5913,—cost considering these figures, $3.00 per 1,000,000 gallons,—assumed cost of

operating the filters, $4.39 per 1,000,000 gallons (the same as the cost at Lawrence for the year 1894).—*Total cost of filtration, $7.39 per 1,000,000 gallons.* (If 2 per cent. for a sinking fund was considered, instead of "deterioration," the total cost per 1,000,000 gallons would be $7.32).

Estimate No. 8.

The following estimate is based upon my own figures :—Ten (10) filter-beds, not covered, having an area of 0.94 of an Acre each, to filter at a rate not to exceed 2,000,000 gallons per Acre per 24 hours, and to have a depth of water over the top of the beds of about 4 feet. Eight (8) of these beds to filter at the rate of 2,000,000, and to have a capacity of 15,000,000 gallons per 24 hours. The other two (2) filter-beds are to be held in reserve for cleaning or other cause.

Total Cost of the filter-beds $291,220, assuming that a suitable quality of sand, which would not need to be washed nor require much screening, could be obtained for the filtering medium in the immediate vicinity of the location of the filter-beds,—interest on total cost, per annum @ 4 per cent., $11,649,—deterioration and repairs per annum, $1,941,—cost considering these figures, $2.48 per 1,000,000 gallons,—assumed cost of operating the plant, $4.39 per 1,000,000 gallons (the same as the cost at Lawrence for the year 1894).—*Total cost of filtration, $6.87 per 1,000,000 gallons.* (If 2 per cent. for a sinking fund was considered, instead of "deterioration," the total cost per 1,000,000 gallons would be $7.67).

Summary of the above Estimates.

The figures in parentheses include 2 per cent. for a sinking fund instead of "deterioration."

Mechanical Filtration.	Total Cost of Plant.	Cost per 1,000,000 Gallons Filtered.	
Estimate No. 1.—Including 60 "Steel" Filters.	$245,172	$7.67	($7.48)
" No. 2.—Including 60 "Cypress" Filters.	$229,452	$7.86	($7.28)
" No. 3.—Including 51 "Steel" Filters.	$212,404	$7.25	($7.08)
" No. 4.—Including 51 "Cypress" Filters.	$198,934	$7.41	($6.91)

Natural Filtration.	Total Cost of Plant.	Cost per 1,000,000 Gallons Filtered.
Estimate No. 5.—Filter-beds covered with Masonry Vaulting, Rate of Filtration 2,000,000 and 2,500,000...........	$525,000	$8.86 ($10.30)
" No. 6.—Filter-beds covered with Wood, Rate of Filtration 2,000,000 and 2,500,000.......	$328,598	$8.14 ($8.05)
" No. 7.—Filter-beds covered with Wood, Rate of Filtration 2,500,000 and 3,125,000.......	$262,878	$7.39 ($7.32)
" No. 8.—Filter-beds Not Covered, Rate of Filtration 2,000,000.......	$291,220	$6.87 ($7.67)

In the estimates of each of the Mechanical Filter Plants, I have assumed that the ground upon which they would be erected was graded, and of a character suitable for the foundation of the building, etc., to rest upon, and in the estimates of the Natural Filter-beds I have assumed that the excavation would be suitable for the construction of the embankments and that not any more than the ordinary difficulties of construction would be encountered. In any of the estimates I have not considered the cost of settling basins, if such should be needed, nor pipes nor conduits leading to and from the filters, etc., etc. Also, I have not considered the cost of land in any of the estimates, which would be of considerable importance in some localities and probably exert more or less influence in the selection of a filter-plant, as, for instance, the Mechanical Filter Plant considered in Estimate No. 1 could be enclosed within an area of less than 1 Acre, while the Natural Filter-beds considered in Estimate No. 8, would require in all probability at least an area of 16 Acres for their site.—E. B. W.

Forty-First Report

RELATING TO THE

REGISTRY AND RETURN

OF

Births, Marriages and Deaths,

AND OF DIVORCE,

IN THE

STATE OF RHODE ISLAND,

FOR THE

YEAR ENDING DECEMBER 31, 1893.

PREPARED BY

GARDNER T. SWARTS, M. D.,

STATE REGISTRAR OF VITAL STATISTICS; SECRETARY OF THE STATE BOARD OF HEALTH;
COMMISSIONER OF PUBLIC HEALTH.

PROVIDENCE:
E. L. FREEMAN & SON, STATE PRINTERS,
1894.

MEMBERS

OF THE

RHODE ISLAND STATE BOARD OF HEALTH.

	Post Office Address.	
ALBERT G. SPRAGUE, M. D., *President*	RIVER POINT	KENT COUNTY.
SAMUEL M. GRAY, C. E.	PROVIDENCE	PROVIDENCE CO.
PAUL S. REDFIELD, M. D	PROVIDENCE	PROVIDENCE CO.
REV. GEORGE L. LOCKE	BRISTOL	BRISTOL COUNTY.
ALEXANDER B. BRIGGS, M. D	ASHAWAY	WASHINGTON CO.
PETER F. CURLEY, M. D.	NEWPORT	NEWPORT COUNTY.
GARDNER T. SWARTS, M. D.	PROVIDENCE	PROVIDENCE CO.

GARDNER T. SWARTS, *Secretary.*

State of Rhode Island and Providence Plantations.

Office of the State Registrar of Vital Statistics.

Providence, January 15, 1895.

To the Honorable General Assembly:

The Forty-First Annual Report upon the Registration of Births, Marriages and Deaths in Rhode Island, and including judicial procedures in relation to divorce, during the year 1893, with compendiary Tables of the results of registration in previous years, is herewith respectfully submitted.

The plan of preceding years, in regard to the general arrangement of the Tables, summaries and comments, has been followed in this report, with some additional Tables, and a few special changes made to meet certain requirements.

In the special Tables the object has been to present the important facts of many years of registration, as well as of single years, in such manner as to make them readily apparent, and relieve the reader of the statistics of much of the labor of personal examination of each of the general Tables of the preceding reports, for the purpose of ascertaining the relation the various facts bear to each other.

With great respect,

GARDNER T. SWARTS,

State Registrar.

CONTENTS.

See INDEX, *page* 273.

GENERAL TABLES.

SPECIAL TABLES, RESULTS AND COMMENTS.

REPORT UPON THE REGISTRATION

OF

Births, Marriages and Deaths

IN

RHODE ISLAND,

FOR THE

YEAR ENDING DEC. 31, 1893,

AND

FOR VARIOUS PERIODS FROM 1853 TO 1893, INCLUSIVE.

Table I.

General Summary of Births and Marriages in the State of Rhode Island during the year 1893.

TOWNS AND DIVISIONS OF THE STATE.	BIRTHS.							MARRIAGES.				
		SEX.		PARENTAGE.					NATIVITY.			
	Whole Number.	Males.	Females.	Native.	Foreign.	Native Father. Foreign Mother.	Foreign Father. Native Mother.	Whole Number.	Native.	Foreign.	Native Groom. Foreign Bride.	Foreign Groom. Native Bride.
Barrington	26	15	11	11	7	3	5	13	11	1	...	1
Bristol	111	54	57	54	35	8	14	48	33	5	6	4
Warren	88	38	50	28	47	6	7	53	18	28	4	3
BRISTOL COUNTY	225	107	118	93	89	17	26	114	62	34	10	8
Coventry	128	62	66	51	54	12	11	26	26	...	...	...
East Greenwich	77	41	36	41	22	7	7	41	23	10	5	3
West Greenwich	14	9	5	12	...	1	1	...	...	...	...	...
Warwick	465	233	232	107	268	52	38	171	49	76	26	20
KENT COUNTY	684	345	339	211	344	72	57	238	98	86	31	23
Jamestown	8	4	4	6	2	...	...	4	3	...	1	...
Little Compton	5	5	...	3	...	1	1	9	7	1	1	...
Middletown	35	21	14	19	15	1	...	2	1	...	1	...
NEWPORT CITY	585	283	302	216	247	75	47	151	80	48	6	17
New Shoreham	28	10	18	28	...	...	...	9	9	...	...	...
Portsmouth	13	9	4	8	3	...	2	14	13	...	...	1
Tiverton	81	40	41	31	38	9	3	19	17	1	1	...
NEWPORT COUNTY	755	372	383	311	305	86	53	208	130	50	10	18
Burrillville	127	54	73	44	55	13	15	45	25	8	5	7
Cranston	179	87	92	86	67	20	6	50	38	5	6	1
Cumberland	246	131	115	53	132	29	32	85	16	44	11	14
East Providence	199	93	106	110	63	13	13	95	71	8	8	8
Foster	27	16	11	25	1	...	1	15	13	1	...	1
Glocester	38	21	17	24	9	4	1	12	11	...	1	...
Johnston	270	143	127	78	148	21	23	59	26	18	7	8
Lincoln	761	370	391	116	493	76	76	181	29	106	15	31
North Providence	74	37	37	22	36	6	10	6	2	1	2	1
North Smithfield	64	44	20	10	40	3	11	22	6	8	2	6
Pawtucket	824	433	391	257	342	117	108	346	124	143	41	38
PROVIDENCE CITY	4,194	2,139	2,055	1,354	2,130	358	352	1,608	687	582	157	182
Scituate	68	33	35	52	7	4	5	30	27	...	1	2
Smithfield	42	25	17	20	11	8	3	16	6	5	3	2
Woonsocket	805	412	393	138	507	73	87	239	71	105	31	32
PROVIDENCE COUNTY	7,918	4,038	3,880	2,389	4,041	745	743	2,809	1,152	1,034	290	333
Charlestown	14	10	4	10	3	...	1	7	6	1	...	...
Exeter	6	2	4	6	...	...	...	11	11	...	...	...
Hopkinton	59	28	31	49	1	2	7	28	26	1	1	...
Narragansett	18	10	8	12	3	3	...	9	8	1	...	...
North Kingstown	90	44	46	59	7	16	8	22	20	1	1	...
South Kingstown	103	53	50	88	6	6	3	32	23	3	3	3
Richmond	24	11	10	20	2	2	...	7	7	...	...	...
Westerly	152	82	70	55	72	7	18	59	34	13	5	7
WASHINGTON COUNTY	466	243	223	299	94	36	37	175	135	20	10	10

Table I.—Continued.

General Summary of Deaths in the State of Rhode Island, during the year 1893.

DEATHS.

Whole Number.	Sex.		Parentage.		Ages Given.		Aggregate Age in Years.		Average Age in Years.		Aggregate Ages.	Average Age.
	Males.	Females.	Native.	Foreign.	Males.	Females.	Males.	Females.	Males.	Females.		
22	9	13	14	8	9	13	591	551	65.66	42.38	1,142	51.91
108	68	40	70	38	68	40	3,127	2,253	45.98	56.32	5,380	49.81
98	41	57	51	47	41	57	1,422	2,441	34.68	42.82	3,863	39.42
228	118	110	135	93	118	110	5,140	5,245	43.56	47.68	10,385	45.55
107	48	59	79	28	48	59	1,730	2,527	36.04	42.83	4,257	39.79
67	31	36	42	25	31	36	1,291	1,337	41.65	37.14	2,628	39.22
13	9	4	12	1	9	4	665	248	73.88	62.00	913	70.23
391	216	175	120	271	215	174	4,512	4.366	20.99	25.09	8,878	22.82
578	304	274	253	325	303	273	8,198	8,478	27.06	31.05	16,676	28.95
17	8	9	16	1	8	9	282	344	35.25	38.22	626	36.82
14	8	6	14	......	8	6	553	484	69.12	80.67	1,037	74.07
14	6	8	7	7	6	8	114	310	19.00	38.75	424	30.29
370	196	174	184	186	196	174	6,755	7,441	34.46	42.76	14,196	38.37
34	17	17	30	4	17	17	817	670	48.06	39.41	1,487	43.74
19	12	7	15	4	11	7	521	388	47.36	55.43	909	50.50
46	19	27	26	20	19	27	755	631	39.74	23.37	1,386	30.13
514	266	248	292	222	265	248	9,797	10,268	36.97	41.40	20,065	39.11
112	60	52	49	63	60	52	2,239	1,670	37.32	32.12	3,909	34.90
130	60	70	65	65	60	70	1,651	2,073	27.52	29.61	3,724	28.65
185	85	100	49	136	85	100	2,242	2,469	26.38	24.69	4,711	25.46
150	81	69	94	56	80	69	2,712	2,870	33 90	41.59	5,582	37 46
24	11	13	24	....	11	13	469	896	42.63	68.92	1,365	56.87
28	18	10	19	9	18	10	815	493	45.28	49.30	1,308	46.71
200	101	99	79	121	101	98	2,785	3,140	27.57	32.04	5,925	29.77
451	231	220	83	368	230	219	4,373	4,907	19.01	22 41	9,280	20.67
38	17	21	14	24	17	21	277	530	16.29	25.24	807	21.24
44	27	17	24	20	26	17	999	678	38.42	39.88	1,677	39.00
599	301	298	220	379	300	298	9,408	9,824	31.36	32.96	19,232	32.16
3,141	1,582	1,559	1,242	1,899	1,582	1,559	46,253	51,630	29.24	33.12	97,883	31.16
64	38	26	55	9	38	26	1,847	1,223	48.61	47.04	3,070	47.97
44	21	23	27	17	21	23	746	1,187	35.52	51.61	1,933	43.93
438	215	223	89	349	213	223	4,637	5,916	21.77	26.53	10,553	24.20
5,648	2,848	2,800	2,133	3,515	2,842	2,798	81,453	89,506	28.66	31.99	170,959	30.31
5	2	3	4	1	2	3	80	73	40.00	24.33	153	30.60
17	9	8	17	....	9	8	610	438	67.78	54.75	1,048	61.65
42	18	24	37	5	18	24	1,019	1,156	56 61	48.17	2,175	51.79
12	8	4	10	2	8	4	223	144	27.87	36.00	367	30.58
51	17	34	41	10	17	34	934	1,627	54.94	47.85	2,561	50 22
66	37	29	49	17	37	29	1,807	1,388	48.84	47.86	3.195	48.41
20	13	7	14	6	13	7	604	481	46.46	68.71	1,085	54.25
94	51	43	59	35	51	43	2,371	1,873	46.49	43.56	4,244	45.15
307	155	152	231	76	155	152	7,648	7,180	49.34	47.24	14,828	48.30

TABLE I.—Continued.—(RECAPITULATION.)

General Summary of Births and Marriages in the State of Rhode Island during the year 1893.

COUNTIES.	BIRTHS.							MARRIAGES.				
		SEX.		PARENTAGE.					NATIVITY.			
	Whole Number.	Males.	Females.	Native.	Foreign.	Native Father. Foreign Mother.	Foreign Father. Native Mother.	Whole Number.	Native.	Foreign.	Native Groom. Foreign Bride.	Foreign Groom. Native Bride.
BRISTOL........	225	107	118	93	89	17	26	114	62	34	10	8
KENT....	684	345	339	211	344	72	57	238	98	86	31	23
NEWPORT.......... ..	755	372	383	311	305	86	53	208	130	50	10	18
PROVIDENCE....... ...	7,918	4,038	3,880	2,389	4,041	745	743	2,809	1,152	1,034	290	333
WASHINGTON	466	243	223	299	94	36	37	175	135	20	10	10
STATE INSTITUT'NS.	......	......	......	......	......	....	...	......	......	......	.. .	....
WHOLE STATE.	10,048	5,105	4,943	3,303	4,873	956	916	3,544	1,577	1,224	351	392

TABLE I.—Continued.—(RECAPITULATION.)

General Summary of Deaths, in the State of Rhode Island, by Counties, during the year 1893.

DEATHS.

Whole Number.	Sex.		Parentage.		Ages Given.		Aggregate Age in Years.		Average Age in Years.		Aggregate Ages.	Average Age.
	Males.	Females.	Native.	Foreign.	Males.	Females.	Males.	Females.	Males.	Females.		
228	118	110	135	93	118	110	5,140	5,245	43.56	47.68	10,385	45.55
578	304	274	253	325	303	273	8,198	8,478	27.06	31.05	16,676	28.95
514	266	248	292	222	265	248	9,797	10,268	36.97	41.40	20,065	39.11
5,648	2,848	2,800	2,133	3,515	2,842	2,798	81,453	89,506	28.66	31.99	170,959	30.31
307	155	152	231	76	155	152	7,648	7,180	49.34	47.24	14,828	48.30
165	98	67	57	108	98	65	4,879	3,258	49.79	50.12	8,137	49.92
7,440	3,789	3,651	3,101	4,339	3,781	3,646	117,115	123,935	30.97	33.99	241,050	32.46

Table II.—BIRTHS, 1893.

Arranged by Months, Sexes, and Divisions of the State.

MONTHS.	SEX.	Whole State.	DIVISIONS OF THE STATE. Bristol County.	Kent County.	Newport County Towns.	Newport City.	Providence County Towns.	Providence City.	Pawtucket.	Woonsocket.	Washington County.
January...	Male.. ..	441	8	37	6	25	86	184	27	44	24
	Female ..	400	9	22	7	29	82	161	37	33	20
	Total....	841	17	59	13	54	168	345	64	77	44
February..	Male.. ..	343	5	26	4	18	62	159	32	20	17
	Female ..	356	9	25	3	17	60	168	26	33	15
	Total ..	699	14	51	7	35	122	327	58	53	32
March....	Male.. ..	434	5	22	8	16	96	184	37	42	24
	Female ..	400	11	32	6	21	77	165	31	28	29
	Total....	834	16	54	14	37	173	349	68	70	53
April.	Male.. ..	361	5	26	6	18	71	159	37	27	12
	Female ..	381	9	16	8	21	77	175	20	38	17
	Total....	742	14	42	14	39	148	334	57	65	29
May......	Male.. ..	381	8	23	6	13	90	149	38	36	18
	Female ..	347	4	23	3	26	64	153	22	35	17
	Total....	728	12	46	9	39	154	302	60	71	35
June......	Male.. ..	420	11	35	2	19	91	174	25	40	23
	Female ..	401	12	35	4	26	90	157	26	35	16
	Total....	821	23	70	6	45	181	331	51	75	39
July......	Male.. ..	472	12	29	6	21	103	212	31	33	25
	Female ..	468	12	29	12	24	104	198	36	33	20
	Total....	940	24	58	18	45	207	410	67	66	45

Table II.—BIRTHS, 1893.—Continued.

MONTHS.	SEX.	Whole State.	Bristol County.	Kent County.	Newport County Towns.	Newport City.	Providence County Towns.	Providence City.	Pawtucket.	Woonsocket.	Washington County.
			DIVISIONS OF THE STATE.								
August....	Male.. ..	429	17	30	10	24	97	162	34	36	19
	Female ..	443	7	29	5	19	99	187	38	46	13
	Total....	872	24	59	15	43	196	349	72	82	32
September.	Male.. ..	453	7	39	13	32	83	177	39	47	16
	Female ..	409	7	25	10	26	85	178	39	22	17
	Total....	862	14	64	23	58	168	355	78	69	33
October...	Male.. ..	418	10	25	11	30	88	171	32	31	20
	Female ..	450	13	41	9	26	91	185	36	32	17
	Total....	868	23	66	20	56	179	356	68	63	37
November.	Male.. ..	454	9	29	6	38	85	192	51	24	20
	Female ..	416	10	21	8	31	105	159	38	28	16
	Total....	870	19	50	14	69	190	351	89	52	36
December..	Male.. ..	499	10	24	11	29	102	216	50	32	25
	Female ..	472	15	41	6	36	107	169	42	30	26
	Total....	971	25	65	17	65	209	385	92	62	51
Whole Year	Male.. ..	5,105	107	345	89	283	1,054	2,139	433	412	243
	Female ..	4,943	118	339	81	302	1,041	2,055	391	393	223
	Total....	10,048	225	684	170	585	2,095	4,194	824	805	466

Table III.—PLURALITY BIRTHS, 1893.

ARRANGED BY MONTHS, SEXES AND DIVISIONS OF THE STATE; AND SHOWING THE NATIVITY OF THE PARENTS.

MONTHS.	Number of Cases.	SEX.	Number of Children.	Divisions of the State: Bristol County.	Kent County.	Newport County.	Newport City.	Providence County.	Providence City.	Washington County	Nativity of the Parents: Native.	Canadian.	English.	German.	Italian.	Irish.	Russian.	Swedish.	Western Islands.	American Father. Canadian Mother.	American Father. Nova Scotia Mother.	American Father. Irish Mother.	English Father. American Mother.	English Father. Australian Mother.	English Father. Canadian Mother.	English Father. Irish Mother.	English Father. Scotch Mother.	German Father. American Mother.	German Father. Polish Mother.	Irish Father. American Mother.	Irish Father. New Brunswick Mo.	Scotch Father. Canadian Mother.	Swedish Father. English Mother.
January	9	Males Females	10 8	..	..	..	1	3	5	..	4	1	1	1	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	..	..	..	..
February	5	Males Females	7 3	..	..	..	..	4	1	..	..	3	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
March	5	Males Females	2 8	..	..	..	1	1	3	..	2	1	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
April	7	Males Females	4 11	..	1	..	..	2	4	..	3	..	..	..	..	..	..	1	..	1	..	1	..	1	..	..	..	..	..	..	..	..	..
May	9	Males Females	9 9	..	..	..	2	4	3	..	4	1	..	..	..	1	..	..	..	..	1	1	1	..	..	..	..	..	..	..	..	..	..
June	8	Males Females	7 9	..	..	..	..	3	5	..	4	1	..	..	..	..	..	..	..	..	1	..	..	..	1	1	..	..	..	..	..	..	..
July	7	Males Females	7 8	..	..	..	2	4	1	..	..	3	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..
August	8	Males Females	9 7	..	1	1	..	2	4	..	2	1	..	..	..	3	..	..	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..
September	8	Males Females	4 12	..	1	3	..	3	1	..	4	1	..	..	..	..	..	..	..	1	..	1	..	..	..	..	1	..	..	..	..	..	..
October	10	Males Females	8 12	..	..	..	1	5	4	..	4	1	..	..	..	4	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
November	7	Males Females	7 7	..	..	..	1	3	3	..	1	..	..	1	..	2	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	..	1
December	10	Males Females	8 12	..	1	..	..	3	6	..	4	2	1	..	1	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	..
Whole Year	93	Males Females	82 106	..	4	4	8	37	40	..	32	15	4	3	1	12	1	1	1	3	2	3	1	1	1	4	1	1	1	2	1	1	1

Table IV.—MARRIAGES, 1893.

Arranged by Months and Divisions of the State.

MONTHS.	Whole State, 1892.	Bristol County.	Kent County.	Newport County Towns.	Newport City.	Providence County Towns.	Pawtucket.	Providence City.	Woonsocket.	Washington County.	Whole State, 1893.
	DIVISIONS OF THE STATE.										
January.......	275	18	18	8	10	45	29	154	37	16	335
February......	289	4	17	5	9	53	25	124	21	9	267
March......	180	3	9	4	6	18	18	52	9	14	133
First Quarter...	744	25	44	17	25	116	72	330	67	39	735
April..........	268	14	29	4	11	66	45	162	22	15	368
May..........	259	7	13	3	7	50	25	119	27	11	262
June........	429	14	32	6	17	91	44	195	26	20	445
Second Quarter.	956	35	74	13	35	207	114	476	75	46	1,075
July...........	218	7	15	1	12	46	29	125	12	12	259
August.......	246	5	15	4	6	42	23	124	22	13	254
September,....	320	13	20	2	15	43	19	136	14	21	283
Third Quarter..	784	25	50	7	33	131	71	385	48	46	796
October.......	408	13	32	2	25	54	32	158	16	11	343
November.....	382	12	30	10	27	71	45	181	20	17	413
December......	228	4	8	8	6	37	12	78	13	16	182
Fourth Quarter.	1,018	29	70	20	58	162	89	417	49	44	938
Whole Year....	3,502	114	238	57	151	616	346	1,608	239	175	3,544

Table V.—DEATHS, 1893.

Arranged by Months, Sexes, and Divisions of the State.

MONTHS.	SEX.	Whole State.	DIVISIONS OF THE STATE. Bristol County.	Kent County.	Newport County Towns.	Newport City.	Providence County Towns.	Pawtucket.	Providence City.	Woonsocket.	Washington County.	State Institutions.
January...	Males ..	323	8	22	4	18	53	26	147	20	16	9
	Females.	321	8	15	7	16	58	33	145	14	13	12
	Total. ..	644	16	37	11	34	111	59	292	34	29	21
February..	Males ..	278	7	21	5	13	48	21	132	14	12	5
	Females.	294	10	21	4	14	69	22	130	13	7	4
	Total. ..	572	17	42	9	27	117	43	262	27	19	9
March ..	Males.	358	12	25	7	17	74	35	157	13	12	6
	Females.	296	10	20	9	11	63	13	136	16	14	4
	Total. ..	654	22	45	16	28	137	48	293	29	26	10
April.	Males.	352	14	27	7	18	79	23	143	18	14	9
	Females.	329	10	23	11	21	60	30	147	14	12	1
	Total. ..	681	24	50	18	39	139	53	290	32	26	10
May..	Males. .	318	9	20	12	12	52	23	142	19	18	11
	Females.	317	6	19	5	16	64	19	149	18	14	7
	Total. ..	635	15	39	17	28	116	42	291	37	32	18
June......	Males. .	272	11	27	3	12	44	20	117	14	13	11
	Females.	239	7	16	1	6	44	27	105	12	15	6
	Total. ..	511	18	43	4	18	88	47	222	26	28	17
July......	Males. .	376	8	24	5	19	85	34	154	23	17	7
	Females.	362	6	39	9	14	64	33	150	30	9	8
	Total. ..	738	14	63	14	33	149	67	304	53	26	15

TABLE V.—DEATHS, 1893.—Continued.

MONTHS.	SEX.	Whole State.	DIVISIONS OF THE STATE. Bristol County.	Kent County.	Newport County Towns.	Newport City.	Providence County Towns.	Pawtucket.	Providence City.	Woonsocket.	Washington County.	State Institutions.
August....	Males . .	365	16	32	11	26	89	29	112	26	18	6
	Females.	354	9	38	3	18	76	23	136	31	15	5
	Total. . .	719	25	70	14	44	165	52	248	57	33	11
September.	Males . .	312	7	31	7	17	67	20	120	20	11	12
	Females.	305	15	17	10	14	61	27	116	23	17	5
	Total. . .	617	22	48	17	31	128	47	236	43	28	17
October...	Males . .	298	7	29	3	19	65	25	117	18	7	8
	Females.	249	8	14	2	13	48	19	106	17	17	5
	Total. . .	547	15	43	5	32	113	44	223	35	24	13
November.	Males . .	253	9	25	3	12	46	20	107	15	9	7
	Females.	248	12	25	11	13	49	20	87	15	10	6
	Total. . .	501	21	50	14	25	95	40	194	30	19	13
December.	Males . .	284	10	21	3	13	48	25	134	15	8	7
	Females.	337	9	27	2	18	64	32	152	20	9	4
	Total. . .	621	19	48	5	31	112	57	286	35	17	11
Whole Year	Males . .	3,789	118	304	70	196	750	301	1,582	215	155	98
	Females.	3,651	110	274	74	174	720	298	1,559	223	152	67
	Total. . .	7,440	228	578	144	370	1,470	599	3,141	438	307	165

TABLE VI.—DEATHS, 1893.

Exhibiting the Whole Number, the Proportion to Population, the Number of each Sex, and the Number in each Period of Life, in every Town and Division of the State.

TOWNS AND DIVISIONS OF THE STATE.	Estimated Population in 1893.	DEATHS. Total.	Per 1000 of population.	SEX.	Number of each Sex.	Under 1 year.	1 to 2.
Barrington.	1,500	22	14.7	Males.	9	. . . .	. . . .
				Females . . .	13	4	. . . .
Bristol.	5,322	108	20.3	Males. . . .	68	10	3
				Females. . .	40	3	1
Warren	4,657	98	21.0	Males.	41	10	. . . .
				Females. . .	57	11	1
BRISTOL COUNTY. . .	11,479	228	19.9	Males.	118	20	3
				Females. . .	110	18	2
Coventry.	5,225	107	20.5	Males.	48	8	7
				Females. . .	59	10	3
East Greenwich. . .	3,408	67	19.7	Males. . .	31	5	2
				Females. . .	36	7	2
West Greenwich . .	759	13	17.1	Males.	9	. . .	. . .
				Females. . .	4	1	. . . .
Warwick	20,446	391	19.1	Males.	216	84	16
				Females. . .	175	57	12
KENT COUNTY.	29,838	578	19.4	Males. . . .	304	97	25
				Females. . .	274	75	17
Jamestown.	822	17	20.7	Males.	8	1	1
				Females. . .	9	3	. . . .
Little Compton . . .	1,172	14	11.9	Males. . . .	8	. . . .	. . . .
				Females. . .	6	. . . .	. . .
Middletown.	1,147	14	12.2	Males.	6	4	. . .
				Females. . .	8	4	. . .
NEWPORT CITY	19,392	370	19.1	Males.	196	42	9
				Females. . .	174	32	4
New Shoreham. . . .	1,352	34	25.1	Males.	17	2	1
				Females. . .	17	1	. . . .
Portsmouth.	1,917	19	9.9	Males.	12	2	1
				Females. . .	7	2	. . .
Tiverton	2,918	46	15.8	Males.	19	3	2
				Females. . .	27	8	2
NEWPORT COUNTY	28,720	514	17.9	Males.	266	54	14
				Females. . .	248	50	6
Burrillville.	5,714	112	19.6	Males.	60	19	1
				Females . .	52	15	2
Cranston*	7,403	130	17.6	Males	60	13	5
				Females. . .	70	13	8
Cumberland	8,646	185	21.4	Males. . .	85	24	2
				Females. . .	100	31	7

* Not including State Institutions.

Table VI.—DEATHS, 1893.

2 to 3.	3 to 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 and over.	Age not stated.
....	..	....	....	....	...	1	...	3	1	2	2	...	...
....	1	....	....	....	...	1	....	...	3	4	....	...	....
....	....	1	1	....	6	5	2	12	9	13	6	....	....
....	...	...	1	1	3	....	4	2	6	10	9	....	...
4	...	1	1	2	2	3	5	1	5	3	4	....	....
....	2	....	1	1	....	6	9	6	9	7	4	....	...
4	..	2	2	2	8	9	7	16	15	18	12	....	....
....	3	....	2	2	3	7	13	8	18	21	13	..	...
1	3	2	1	....	1	3	2	4	3	7	4	2	....
....	1	....	...	3	5	2	7	6	9	7	3	3	...
....	1	....	1	2	1	2	1	5	4	3	4	....	....
....	2	2	....	2	1	5	2	2	....	6	4	1	....
....	....	....	....	....	..	....	....	2	...	3	4	....	....
....	...	..	....	....	....	....	....	....	....	1	1	1	....
10	8	9	5	5	13	11	7	11	13	17	5	1	1
2	9	12	3	5	11	11	9	10	11	14	5	3	1
11	12	11	7	7	15	16	10	22	20	30	17	3	1
2	12	14	3	10	17	18	18	18	20	28	13	8	1
1	..	1	....	1	....	....	....	....	....	1	1	1	....
....	....	1	..	....	1	....	....	1	..	....	2	1	....
....	...	....	....	..	...	...	....	2	3	1	2	....	..
....	....	....	....	....	...	...	...	....	1	2	2	1	....
....	....	....	....	....	....	....	1	....	1	....	....	....	....
....	...	....	....	....	....	...	....	....	1	1	2	....	...
3	5	6	1	6	16	16	24	19	24	19	6	...	....
7	4	3	....	4	11	15	15	9	20	24	21	5	....
....	....	....	...	...	3	.	2	....	3	4	2	....	....
...	..	1	....	2	3	4	2	....	1	...	3	....	....
....	...	....	....	....	....	1	1	1	1	2	1	1	1
....	....	....	....	..	....	....	....	....	1	1	3	....	....
1	1	....	....	...	1	2	....	1	2	4	2	...	....
2	...	3	....	2	....	2	2	2	1	3	...	....	....
5	6	7	1	7	20	19	28	23	34	31	14	2	1
9	4	8	....	8	15	21	19	12	25	31	33	7	....
1	1	2	....	....	5	2	4	3	7	9	4	2	....
2	2	1	1	2	2	3	3	2	7	8	1	1	...
1	2	3	1	4	6	4	5	5	9	1	1	....	....
4	4	5	3	1	2	4	3	5	6	8	4	....	....
5	3	4	...	3	8	11	5	5	9	4	2	....	....
....	3	7	3	4	5	11	7	7	8	1	6	....	....

TABLE VI.—DEATHS, 1893.—Continued.

TOWNS AND DIVISIONS OF THE STATE.	Estimated Population in 1893.	DEATHS. Total.	Per 1000 of population.	SEX.	Number of each Sex.	Under 1 year.	1 to 2.
East Providence...	9,386	150	16.0	Males.....	81	13	5
				Females...	69	14	2
Foster...........	1,165	24	20.6	Males. ..	11	2	1
				Females ..	13	1	...
Glocester.........	2,199	28	12.7	Males.....	18	2	1
				Females...	10	3	....
Johnston.........	11,280	200	17.7	Males.....	101	23	7
				Females...	99	17	8
Lincoln	22,231	451	20.3	Males....	231	99	12
				Females...	220	69	17
North Providence .	2,448	38	15.5	Males.....	17	8	1
				Females ..	21	8	1
North Smithfield ..	3,231	44	13.6	Males.....	27	9	1
				Females...	17	5	....
PAWTUCKET.......	30,469	599	19.7	Males.....	301	69	15
				Females ..	298	58	13
PROVIDENCE CITY..	150,000	3,141	20.9	Males.....	1,582	380	97
				Females...	1,559	313	77
Scituate..	2,915	64	21.9	Males....	38	9	....
				Females...	26	..	....
Smithfield........	2,597	44	16.9	Males....	21	4	....
				Females...	23	2	....
WOONSOCKET	23,609	438	18.5	Males.....	215	81	17
				Females...	223	76	11
PROVIDENCE COUNTY	283,293	5,648	19.9	Males.....	2,848	755	165
				Females...	2,800	625	146
Charlestown......	839	5	5.9	Males....	2	1	...
				Females...	3	2	....
Exeter...........	891	17	19.1	Males. ...	9	....	....
				Females...	8	....	....
Hopkinton	2,905	42	14.5	Males.....	18	2	....
				Females...	24	1	...
Narragansett.	1,501	12	8.0	Males.....	8	1	1
				Females...	4	...	....
North Kingstown..	4,372	51	11.7	Males.....	17	1	3
				Females...	34	2	1
South Kingstown..	5,139	66	12.8	Males....	37	4	....
				Females...	29	2	....
Richmond........	1,624	20	12.3	Males.....	13	2	....
				Females...	7	....	....
Westerly.	7,101	94	13.2	Males.....	51	7	1
				Females...	43	5	....
WASHINGTON CO...	24,372	307	12.6	Males.....	155	18	5
				Females...	152	12	1
State Institutions..	1,877	165	87.9	Males.....	98	2	....
				Females...	67	2	....

TABLE VI.—DEATHS, 1893.—Continued.

2 to 3.	3 to 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 and over.	Age not stated.
6	....	1	1	3	10	5	11	5	6	9	5	....	1
....	1	1	....	1	3	4	10	8	10	13	1	1	....
....	....	1	....	....	....	....	1	1	2	2	1	....	..
....	....	....	....	...	....	...	1	....	4	2	4	1	....
....	1	..	1	..	2	1	1	1	2	2	4	....	....
....	....	...	...	..	...	1	....	....	2	1	3	...	....
2	7	6	1	3	10	3	10	12	7	7	1	2	....
3	1	8	....	2	6	11	9	10	15	7	1	....	1
9	10	9	2	6	13	19	16	12	9	7	6	1	1
7	11	10	9	10	14	11	17	13	15	8	7	1	1
....	....	2	....	1	1	1	....	2	....	1	....	....	....
....	1	....	1	....	2	1	1	2	4	...	....	....	....
....	1	..	...	..	...	2	2	1	1	6	3	...	1
1	....	....	....	....	2	...	2	1	1	2	3	....	...
6	11	14	4	13	29	21	23	23	30	26	12	4	1
6	14	23	12	6	24	19	21	23	28	30	18	3	....
38	49	74	26	47	135	142	150	155	137	112	37	3	...
43	42	50	23	39	140	150	142	162	193	114	62	9	...
....	...	2	....	...	2	....	4	....	3	11	7	....	...
....	1	2	...	4	2	1	2	2	6	3	3	...	...
...	1	1	4	....	2	....	1	....	2	2	4	...	...
....	1	1	....	..	2	2	3	..	2	6	2	2	....
3	5	8	5	9	15	12	14	18	8	11	5	2	2
2	3	6	2	10	27	12	11	26	18	11	6	2	...
71	91	127	45	89	238	223	247	243	232	210	92	14	6
68	84	114	54	79	231	230	232	261	319	214	121	20	2
....	....	....	....	....	..	....	.	..	.	1	....	.	....
....	..	....	....	..	....	...	...	....	...	1	....	..	....
....	....	...	..	....	1	1	...	1	....	3	2	1	....
....	....	1	...	....	1	....	....	2	2	1	1	....	....
...	....	..	....	....	..	2	2	1	2	6	2	1	....
3	..	....	..	1	2	2	3	1	4	3	4	...	....
....	....	1	....	2	....	....	1	1	...	1	....	..	....
....	....	...	....	2	...	....	....	2	...	....	....	....	....
....	..	....	....	....	....	....	1	3	1	3	4	1	....
1	1	1	1	....	4	2	2	5	4	5	3	2	....
2	....	2	....	1	4	1	1	2	5	12	3	....	....
....	....	..	...	2	2	5	4	1	6	5	2	..	....
....	1	..	.	1	....	1	...	1	3	3	1	....	....
....	....	....	....	....	1	....	...	1	....	3	1	1	....
...	1	....	...	2	3	8	4	5	6	5	8	1	....
1	....	1	....	1	8	4	3	4	7	5	3	1	....
2	2	3	....	6	8	13	9	14	17	34	20	4	....
5	1	3	1	6	18	13	12	16	23	23	14	4	....
....	....	....	....	1	12	16	19	16	15	13	3	1	....
....	....	....	1	3	6	8	9	11	10	10	5	....	2

TABLE VI Continued.—DEATHS, 1893.—RECAPITULATION.

DIVISIONS OF THE STATE.	Estimated Population in 1893.	DEATHS. Total.	DEATHS. Per 1000 of Population.	DEATHS. SEX.	DEATHS. Number of each Sex.	Under 1 year.	1 to 2.
BRISTOL COUNTY...	11,479	228	19.9	Males.....	118	20	3
				Females...	110	18	2
KENT COUNTY.....	29,838	578	19.4	Males.....	304	97	25
				Females...	274	75	17
NEWPORT COUNTY..	28,720	514	17.9	Males.....	266	54	14
				Females...	248	50	6
PROVIDENCE COUNTY	283,293	5,648	19.9	Males.....	2,848	755	165
				Females...	2,800	625	146
WASHINGTON CO...	24,372	307	12.6	Males. ...	155	18	5
				Females...	152	12	1
STATE INSTITUTIONS.	1,877	165	87.9	Males.....	98	2	....
				Females...	67	2	....
WHOLE STATE.....	379,579	7,440	19.6	Males.....	3,789	946	212
				Females...	3,651	782	172

TABLE VI Continued.—DEATHS, 1893.—RECAPITULATION.

2 to 3.	3 to 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 and over.	Age not stated.
4	...	2	2	2	8	9	7	16	15	18	12	....	....
....	3	..	2	2	3	7	13	8	18	21	13	....	....
11	12	11	7	7	15	16	10	22	20	30	17	3	1
2	12	14	3	10	17	18	18	18	20	28	13	8	1
5	6	7	1	7	20	19	28	23	34	31	14	2	1
9	4	8	....	8	15	21	19	12	25	31	33	7	....
71	91	127	45	89	238	223	247	243	232	210	92	14	6
68	84	114	54	79	231	230	232	261	319	214	121	20	2
2	2	3	....	6	8	13	9	14	17	34	20	4	..
5	1	3	1	6	18	13	12	16	23	23	14	4	....
....	...	....	....	1	12	16	19	16	15	13	3	1	....
....	.	....	1	3	6	8	9	11	10	10	5	....	2
93	111	150	55	112	301	296	320	334	333	336	158	24	8
84	104	139	61	108	290	297	303	326	415	327	199	39	5

TABLE VII.—CAUSES OF DEATH, 1893.

Arranged Alphabetically; showing the Number of each Sex, who died from each cause, in each month and the whole year 1893, also the Number of Native and of Foreign Parentage, from each cause, for the year.

CAUSES OF DEATH.	Jan.		Feb.		Mar.		April.		May.		June.		July.		Aug.		Sept.		Oct.		Nov.		Dec.		PARENTAGE.		SEX.		Total.
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Am.	For.	M.	F.	
Abortion		2						1						1				1				1		1	6	1		7	7
Abscess of Abdomen													1												1		1		1
Brain	1			1				1	1												1				2	3	3	2	5
Cervical Gland																			1						1		1		1
Kidney										1									1							2	1	1	2
Liver			1						1			1				1									2	2	2	2	4
Lung																	1				1				1	1	2		2
Neck															1										1		1		1
Otitis Interna																				1					1			1	1
Pelvis								1																	1			1	1
Psoas				1											1											2	1	1	2
Recto Perineal																	1								1		1		1
Stomach					1																					1	1		1
Thigh											1															1	1		1
Throat		1																							1			1	1
Unspecified							2												2		1				4	1	5		5
Accidents, Asphyxia		1	1	1	2		4					1	1					1			1	1			5	9	9	5	14
Boiler Explosion							3																		2	1	3		3
Burns and Scalds	3	2	2			1	1	1			2		2	1	2	1			2	1	1	1	2	1	9	17	17	9	26
Crushed by Weight											1															1	1		1
Dislocated Vertebræ									1														1			2	2		2

CAUSES OF DEATH.	Jan.		Feb.		Mar.		April.		May.		June.		July.		Aug.		Sept.		Oct.		Nov.		Dec.		PARENTAGE.		SEX.		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M	F.	M.	F.	M.	F.	M.	F.	M.	F.	Am.	For.	M.	F.	Total.
Accidents, Drowning			6	1			2	2	4	1	2		8	2	5		2	1	5		1		3	2	17	30	38	9	47
Electric Shock											1														1		1		1
Explosion of Powder	2												3													5	5		5
Exposure to Cold			1		1																				1	1	2		2
Falls	2	1	2		1		3		2		1	1	2		2			2	1	1	4				8	17	20	5	25
Fractures and Contusions	3					1	3		1		2	1	1	2		2	1		2		1	4	1		7	18	15	10	25
Gunshot Wounds																			1				1		1	1	2		2
Injury at Birth	1				1																				1	1	2		2
Inhalation of Foreign Body													1													1	1		1
Landslide																	1									1	1		1
Machinery																							1			1	1		1
Pistol Wound																							1			1	1		1
Poisoning by Alcohol	1																									1	1		1
by Carbolic Acid																					1					1	1		1
by Lead					1																					1	1		1
by Oil of Almonds													2													2	2		2
by Opium																		1								1		1	1
by White Drops																								1		1		1	1
Otherwise			1						1		1					1	1		1		1				2	5	6	1	7
Railroad	5	5	1		1	1	3		2		1		7			1			3		4	1	3	1	7	32	30	9	39
Strangulation	1				1						1												1			4	4		4
by Foreign Body in Œsophagus					1																				1		1		1
Suffocation					1	1			2	1			2				1	1	1			2	2		7	7	9	5	14
Surgical Operation		2			1	1	1	1			1			1	1						1	1			6	5	5	6	11
Run over by Horse Cars										1															1			1	1

Table VII.—CAUSES OF DEATH, 1893.—Continued.

CAUSES OF DEATH.	Jan. M.	Jan. F.	Feb. M.	Feb. F.	Mar. M.	Mar. F.	April. M.	April. F.	May. M.	May. F.	June. M.	June. F.	July. M.	July. F.	Aug. M.	Aug. F.	Sept. M.	Sept. F.	Oct. M.	Oct. F.	Nov. M.	Nov. F.	Dec. M.	Dec. F.	Parentage. Am.	Parentage. For.	Sex. M.	Sex. F.	Total.
Accidents, Various	1	1	..	..	1	1	3	..	1	..	..	..	1	1	..	.	3	..	1	..	1	..	2	..	9	8	14	3	17
Albuminaria	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	1	...	1	1
Alcoholism	4	..	..	..	1	2	3	..	3	2	2	..	2	..	2	..	2	..	1	1	4	1	3	1	13	21	27	7	34
Anæmia	..	2	..	2	..	..	2	2	2	..	..	2	1	..	..	2	..	1	..	2	..	2	..	1	9	12	5	16	21
Aneurism Aorta	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	....	...	1	1
Abdominal Aorta	..	..	..	..	..	..	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	1	1	1	1	2
Unspecified	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	...	1	1
Angina Pectoris	2	..	1	..	..	1	..	..	..	..	1	..	..	..	..	1	..	..	2	1	..	..	3	..	10	2	9	3	12
Apoplexy	13	17	11	7	14	9	9	13	7	10	13	14	10	7	10	12	15	9	11	18	8	5	10	11	139	124	131	132	263
Appendicitis	..	..	..	..	..	..	..	..	..	..	1	..	2	..	.	1	3	..	..	1	1	..	..	1	7	3	7	3	10
Ascites	..	..	..	..	..	..	..	1	..	1	..	..	..	..	1	1	..	..	..	..	..	..	..	1	3	2	1	4	5
Asthenia	3	..	1	..	2	..	3	3	1	2	2	1	2	..	2	5	..	5	4	3	1	4	..	3	30	17	21	26	47
Asthma	..	2	..	1	2	2	..	1	..	..	1	1	..	..	..	..	..	..	..	..	2	..	..	1	7	6	5	8	13
Arterial Sclerosis	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	1	...	1	1
Atelectasis Pulmonum	..	1	2	1	..	..	1	1	..	..	1	..	2	..	..	..	..	..	1	..	1	..	..	..	9	2	8	3	11
Atrophy, Cerebral	..	..	..	..	..	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	1	1	2
Bladder Diseases	1	1	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	..	..	..	3	2	4	1	5
Bowel Diseases	..	..	1	4	..	..	2	1	..	..	..	1	2	1	3	1	..	1	..	..	3	..	..	2	8	14	11	11	22
Inflammation	..	..	1	1	..	..	2	1	..	1	..	2	..	..	1	..	..	1	..	1	..	..	..	..	2	9	4	7	11
Obstruction	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	....	1	1	..	1
Tuberculosis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	...	1	1
Ulceration	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	1	1	...	1
Brain Diseases	1	1	4	..	..	1	..	..	2	..	..	1	1	2	..	1	1	1	..	..	1	..	2	..	6	13	12	7	19
Congestion	..	..	..	1	..	1	1	1	1	..	..	..	1	1	2	2	..	..	..	..	..	1	..	1	8	5	5	8	13

CAUSES OF DEATH.	Jan.		Feb.		Mar.		April.		May.		June.		July.		Aug.		Sept.		Oct.		Nov.		Dec.		PARENTAGE.		SEX		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Am.	For.	M.	F.	Total.
Brain Diseases, Inflammation	1			2			2	1	1	1					5		1	1	1	1		1			3	15	11	7	18
Softening	1	1				1	1	1		1			1	1	1		1						2	1	11	2	7	6	13
Bronchitis, Acute	19	12	16	8	20	25	19	15	14	12	8	9	2	5	5	3	6	4	12	3	9	12	10	15	91	172	140	123	263
Chronic	2	5	4	3	4	1	3	2		4	3		2		1	3	2	1	1	2		3	2	2	13	37	24	26	50
Calculus																			1				1		1	1	2	...	2
Biliary		1																1							...	2	...	2	2
Cancer of Abdomen										1				1											1	1	...	2	2
Bladder														2											2	...	...	2	2
Bowels						1												1		1					2	1	...	3	3
Breast		2		4		4		2		2		2		2				1		3		3		2	17	10	...	27	27
Face	1		1		1												1				1				3	2	5	...	5
Liver	2			4	1		1	1	1	2	1	2			1	3	2	1	2		1	2			15	12	12	15	27
Maxillary (Upper)					1										1						1				1	2	3	..	3
Mesentery				1								1													1	1	..	2	2
Mouth							1		1																1	1	2	...	2
Neck								1									1								1	1	1	1	2
Ovaries								1																	1	...	...	1	1
Pancreas																					1				...	1	1	...	1
Prostate											1														1	...	1	..	1
Pylorus								1																	1	...	..	1	1
Rectum										2		2	1	1		1		1			1				5	4	2	7	9
Stomach	1	2		4	1	3	2			2	2	3		2	1	1	2	1	3	2		2	4	3	20	21	16	25	41
Testicle	1																								1	...	1	...	1
Throat	1																			1					1	1	1	1	2
Tongue											1		1						1						2	1	3	..	3
Uterus		2		5		1		5		2		6		3		3		6		2		2		5	26	16	...	42	42

Table VII.—CAUSES OF DEATH, 1893.—Continued.

CAUSES OF DEATH.	Jan.		Feb.		Mar.		April.		May.		June.		July.		Aug.		Sept		Oct.		Nov.		Dec.		PARENTAGE.		SEX.		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Am.	For.	M.	F.	Total
Cancer of Vagina																						1			1			1	1
Vulva																1									1			1	1
Unspecified	1	4	1	1		3			2	2	1	1		2				4	1			2		1	20	6	6	20	26
Carbuncle									1												1		1		1	2	3		3
Catarrh				1				1																	1	1		2	2
Cellulitis														1												1		1	1
Cephalæmatonia																							1		1		1		1
Cerebritis	1			1					1		1		1												2	3	4	1	5
Childbirth		1		2		3		4				3						1		1		2		1	5	13		18	18
Peritonitis								2		1		1								2					1	5		6	6
Phlegmasia Dolens						1																			1			1	1
Puerperal Convulsions				2																				1	3			3	3
Fever		1		1		1		3								1										7		7	7
Hemorrhage		1																2								3		3	3
Mania																						1				1		1	1
Septicæmia		2		1		1		1		1		1						1							4	4		8	8
Uræmic Coma														1											1			1	1
Cholera Infantum	1		2	1	2	4	2	2	2	3	14	8	96	87	102	81	43	43	15	6	2	3	1	1	150	371	282	239	521
Cholera Morbus				2	1								5	4	6	9	5	2	1						13	22	18	17	35
Chorea			1															1				1		1		4	1	3	4
Chyluria																	1								1		1		1
Colic													1												1		1		1
Consumption	22	19	19	19	29	27	24	31	28	21	18	24	11	31	19	21	19	25	17	18	21	15	19	18	165	350	246	269	515
Convulsions	6	8	4	6	11	8	8	6	9	4	5	4	1	8	8	4	10	4	3	2	4	5	10	4	42	100	79	63	142

CAUSES OF DEATH.	Jan.		Feb.		Mar.		April.		May.		June.		July.		Aug.		Sept.		Oct.		Nov.		Dec.		PARENTAGE.		SEX.		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Am.	For.	M.	F.	Total.
Coxitis, Acute	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	1	...	1	1
Croup	2	..	4	5	5	1	4	1	2	..	..	1	3	..	1	1	..	1	3	..	3	7	2	4	13	37	29	21	50
Membraneous	1	3	2	5	2	1	4	2	..	..	2	1	1	2	..	..	..	2	5	5	4	1	2	..	17	29	24	22	46
Cyanosis	2	..	..	..	2	..	3	..	..	..	..	..	..	..	..	..	..	..	..	1	..	2	..	..	3	7	7	3	10
Cystitis	2	..	..	..	3	1	..	1	2	..	..	..	2	..	1	1	3	..	2	..	1	..	3	..	14	8	19	3	22
Debility, General	1	2	..	1	2	4	2	4	..	..	..	..	..	2	1	1	1	1	2	2	1	2	1	..	13	17	11	19	30
Infantile	3	6	4	2	8	3	1	4	6	5	5	4	6	6	6	3	5	4	11	3	5	6	5	6	38	84	65	52	117
Premature Birth	3	2	2	3	4	3	3	5	6	3	2	2	3	5	4	4	5	1	1	2	5	5	5	7	45	40	43	42	85
Senile	..	1	1	2	..	..	1	1	..	..	2	..	..	..	..	2	1	..	..	1	..	1	..	1	7	7	5	9	14
Delirium Tremens	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	....	1	...	1
Dementia	..	..	..	..	..	1	..	..	..	1	..	..	..	2	..	2	2	1	1	..	..	1	..	..	2	9	3	8	11
Dementia, Agitata	..	..	..	..	1	..	..	..	..	1	..	..	..	1	..	..	..	1	..	..	..	..	..	..	....	4	1	3	4
Senile	1	2	..	..	..	..	..	..	..	..	..	..	..	1	2	..	..	..	..	..	..	..	..	..	1	5	3	3	6
Dentition	1	..	..	1	..	..	..	..	..	..	1	..	1	1	2	..	..	..	..	..	2	..	1	1	1	10	8	3	11
Diabetes	2	..	1	1	..	..	4	2	..	3	..	..	..	2	..	..	..	2	1	..	1	1	1	3	14	9	10	13	23
Mellitus	1	..	2	2	..	3	1	..	..	1	1	..	..	1	..	..	..	..	1	1	1	2	..	..	8	8	7	10	17
Diarrhœa, Acute	3	1	1	3	..	2	1	1	1	1	3	1	14	10	11	9	11	7	3	8	2	..	1	2	31	65	51	45	96
Chronic	..	..	1	..	1	..	1	1	..	..	..	1	1	..	..	3	1	4	4	2	1	..	..	..	11	10	10	11	21
Difficult Labor	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	....	1	...	1
Diphtheria	4	5	1	4	3	5	3	2	7	5	3	5	6	3	1	5	4	4	8	3	4	11	7	8	44	71	51	60	111
Dropsy	..	1	1	4	1	2	..	6	..	1	1	2	..	2	2	..	4	4	1	1	1	2	..	3	16	23	11	28	39
Dysentery	1	..	2	..	5	..	1	..	1	2	..	..	2	7	1	6	3	4	1	4	1	..	..	..	14	27	18	23	41
Chronic	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	1	...	1	1
Dyspepsia	..	..	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	2	...	3	3
Eclampsia	..	..	..	1	1	..	..	1	..	..	..	..	..	2	..	1	1	..	..	..	1	1	..	..	4	5	3	6	9
Embolism	..	2	..	..	..	..	..	..	..	..	2	1	..	..	..	..	..	..	1	..	..	..	2	1	5	4	5	4	9

TABLE VII.—CAUSES OF DEATH, 1893.—Continued.

CAUSES OF DEATH.	Jan.		Feb.		Mar.		April.		May.		June.		July.		Aug.		Sept.		Oct.		Nov.		Dec.		PARENTAGE.		SEX.		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Am.	For.	M.	F.	Total.
Empyema										1																1		1	1
Emphysema							1		1										1		1					4	4		4
Endocarditis	1	1	1	1				1							1		1					2			2	7	4	5	9
Enteritis	1	3	5		1	2	1	1		1	3		6	2	9	2	2	3	4	2		1	2	1	20	32	34	18	52
Gastro	2		2	2		3	1	1	1	2	1	4	6	7	6	5	3	3	3	5	1	2	1	2	27	36	27	36	63
Entero-Colitis									1			1	7	2	4	5	3	4	3	3				2	17	18	18	17	35
Epilepsy	1		1	2		1				2				1	1			1		2					6	6	3	9	12
Erysipelas		4	2	1	2		2	3	1	2						1		1			1	1		2	9	14	8	15	23
Exhaustion	2		1	2	2			1	1	2							1					1	1	2	8	8	8	8	16
Fever, Gastric						1									1			1							1	2	1	2	3
Intermittent						1						1				1			1	1				1	3	3	1	5	6
Malarial																		2				1			1	2	...	3	3
Typho											1															1	1	...	1
Remittent	1														1				1	1					1	3	3	1	4
Typhoid	7	1	2	2	6	1	5	5	2	2	2	2	4	6	9	6	5	3	5	12	8	5	10	5	41	74	65	50	115
Unspecified																						1			1	...	...	1	1
Gall Stones										1		1			1					1					3	1	1	3	4
Gangrene of Foot						1	1			1										1			1		3	2	2	3	5
Leg			1							1												1			2	1	1	2	3
Senile	1				1								1						1						4	...	4	..	4
Unspecified				1					1									1				1	1		2	3	2	3	5
Gastritis, Acute	2	1	2	1	1	1	1	1	1	2		1		2	1		2	2	4		1		1	3	11	19	16	14	30
Chronic		1						1		2	1	2	1		1	2		1		2	1		1		9	7	5	11	16
Goitre										1															1	...	...	1	1

CAUSES OF DEATH.	Jan.		Feb.		Mar.		April.		May		June.		July.		Aug.		Sept.		Oct.		Nov.		Dec.		PARENTAGE.		SEX.		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Am.	For.	M.	F.	Total.
Gout			1																						1		1		1
Heart Diseases	7	7	7	10	17	8	11	13	12	14	16	8	8	12	13	12	12	8	9	11	9	19	7	15	142	123	128	137	265
Dilatation	2	1					1		1	1												1		1	2	6	4	4	8
Failure	6	3	4	8	2	3		1	1	3	4	1	1	3	4	2	3	4	2	3	4	1	3	3	30	39	34	35	69
Fatty Degeneration	1			3		1	1	2	3	1				1	1	1									8	7	6	9	15
Hypertrophy	1				1	1	1		1	1											1				4	3	5	2	7
Inflammation	2	2							2	3	1	1				2			1		2		1		4	13	9	8	17
Valvular Disease	5	7	2	3	4	1	2	5	4	3	2	5	7	2	4	3	5	4	7	5	3	5	5	5	45	53	50	48	98
Hæmatemesis													1	1											1	1	1	1	2
Hæmoptysis		1																								1		1	1
Hemiplegia	1						1	2		1	3	1													7	2	5	4	9
Hemorrhage, Cerebral	1					1			1	1	1	2	1					1		1	2	1			8	5	6	7	13
from Bowels																1	1									2	1	1	2
from Lungs		1	1								2		2		1	1					3				5	6	9	2	11
from Stomach																						1			1			1	1
from Umbilicus	1	1					2										1								2	3	4	1	5
from Uterus										1								1							1	1		2	2
Unspecified			1	1	1											1				1	1				1	5	3	3	6
Hepatitis	1	2	1		1												3	1	1	2		2			8	6	7	7	14
Hernia			3		1		1					1	1	1	1					1				1	6	5	7	4	11
Umbilical		2								1										1					2	2		4	4
Hip Disease							1																			1	1		1
Homicide															1		1		1						1	2	3		3
Hydrocephalus	1	1		2	1	1	2	1	1	1	2	1	3	4	1	3	1	1	1		1		2		19	12	16	15	31
Hyperæmia, Cerebral																						1			1			1	1
Hysterectomy										1															1			1	1

TABLE VII.—CAUSES OF DEATH, 1893.—Continued.

CAUSES OF DEATH.	Jan.		Feb.		Mar.		April.		May.		June.		July.		Aug.		Sept.		Oct.		Nov.		Dec.		PARENTAGE.		SEX.		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Am.	For.	M.	F.	Total.
Icterus Neonatorum			1				1												1		1				1	3	4		4
Inanition	1		1	1	1	1	2	1	4	1		1	3		4	2	1	1	3				2		12	18	22	8	30
Indigestion	1	1	1	4	2		3	3		1			1	4	1	1			1	1	3	1		4	11	22	13	20	33
Influenza	2	3	1		2		6	13	7	5	2	2		1	2		1			1		1	11	25	47	38	34	51	85
Innutrition				1													1						1		2	1	2	1	3
Insanity					1	1				2	1	1	1	1				1	1		1				9	2	5	6	11
Insolation																1										1		1	1
Intemperance	3		1					1	1			1								1	1				1	8	6	3	9
Intestinal Obstruction	1																									1	1		1
Intussusception	1		1	1				1		3	1		1			1									7	3	4	6	10
Invagination									1																	1	1		1
Jaundice				1	2											1				1				1	4	2	2	4	6
Kidney Disease	1				1	1		1	3			3			4	1	1		1			2	1	2	14	8	12	10	22
Bright's Disease	7	9	3	8	6	6	8	2	7	7	8	5	4	8	4	6	5	3	5	9	8	7	5	9	73	76	70	79	149
Laparotomy												1		1											2			2	2
Laryngitis						1		1	1						1					2					5	1	2	4	6
Leucocythæmia	1																							1	2		1	1	2
Liver Disease		1		1	1		1	1	1	2			1		2	2	1								5	9	7	7	14
Amyloid Degeneration																	1									1	1		1
Atrophy		1																								1		1	1
Cirrhosis	3	1	1	2	1	1	2	3	2	2	4		3	1	2	1	1		4	1		1	3	1	17	23	26	14	40
Hypertrophy														1								1	1		3		1	2	3
Inflammation										1											1					2	1	1	2
Locomotor Ataxia			1							1	1										1				1	3	3	1	4

CAUSES OF DEATH.	Jan.		Feb.		Mar.		April.		May.		June.		July.		Aug.		Sept.		Oct.		Nov.		Dec.		PARENTAGE.		SEX.		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Am.	For.	M.	F.	Total.
Lung Diseases				1			1		1															1		4	2	2	4
Gangrene														1		1										2		2	2
Œdema	1					2	1					1							1					1	3	4	3	4	7
Lymphangitis													1												1		1		1
Malaria		1					1		1	1			1											1	2	4	3	3	6
Malformation of Anus					1	1											1									3	2	1	3
of Bile Ducts																	1								1		1		1
of Heart (Foramen Ovale)	1					1		1	2		2						1						1	1	7	3	7	3	10
of Palate						1																				1		1	1
Unspecified	1												1		1		1								1	3	4		4
Malignant Pustule																1									1			1	1
Malnutrition		1				3						1	2		1		2	4	1		2		1	1	8	11	9	10	19
Mania, Acute		2													1		1								1	3	2	2	4
Chronic																								1		1		1	1
Marasmus	2	1	1	1	2	2	4	1	5	3	2	3	5	3	9	7	4	6	4	2	2	3	2	4	37	41	42	36	78
Senile			1				1	1					1			1							1		4	2	4	2	6
Measles	8	3	12	9	5	5	6	5	7	10	12	7	2	4	1		1		1	1	1				33	67	56	44	100
Melancholia												1														1		1	1
Meningitis	6	5	9	3	7	7	4	6	5	9	3	4	8	7	6	4	3	4	4	4	3	3	3	3	50	70	61	59	120
Cerebro-Spinal	4	3	3	1	3		2	2			2	2	3	1		5	2		2		4	1	1		19	22	26	15	41
Spinal	1	1	1	3			1		1			1		1	1	1	3	1	1	2				1	11	9	9	11	20
Tubercular		2	1	1		1	4				3			1			2	1	1	1	2			2	9	13	13	9	22
Menopause																								1		1		1	1
Metritis						1																				1		1	1
Myelitis	1			1		2	1				1														3	3	3	3	6
Necrosis of Humerus								1																		1		1	1

TABLE VII.—CAUSES OF DEATH, 1893.—Continued.

CAUSES OF DEATH.	Jan. M.	Jan. F.	Feb. M.	Feb. F.	Mar. M.	Mar. F.	April. M.	April. F.	May. M.	May. F.	June. M.	June. F.	July. M.	July. F.	Aug. M.	Aug. F.	Sept M.	Sept F.	Oct. M.	Oct. F.	Nov. M	Nov. F.	Dec. M.	Dec. F.	PARENTAGE. Am.	PARENTAGE. For.	SEX. M.	SEX. F.	Total.
Necrosis of Jaw	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	...	1	1	...	1
of Spine	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	...	1	...	1	1
of Tibia	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1	...	...	1	1
Nephritis	8	5	6	4	6	4	7	4	7	5	2	2	6	4	4	3	2	4	3	3	4	3	3	9	42	66	58	50	108
Nervous Prostration	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	...	1	...	1	1
Neuritis	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	...	1	1	...	1
Obstipation	..	..	1	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..	2	1	3	...	3
Œdema Glottidis	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	...	...	1	1
Old Age	3	12	2	6	12	7	6	12	3	15	5	7	10	13	6	13	5	11	2	3	11	6	7	6	113	70	72	111	183
Opium Habit	..	..	..	..	1	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	...	1	2	3
Otitis Media	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1	...	1	...	1
Ovaritis	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	...	...	1	1
Paralysis	3	6	9	7	9	4	4	1	2	4	2	1	3	3	2	6	3	3	4	6	6	2	6	3	59	40	53	46	99
Paraplegia	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	2	1	2	3
Paresis	1	2	1	1	1	..	..	1	1	..	..	..	1	2	..	1	..	..	2	..	..	1	..	..	12	3	7	8	15
Pemphigus Neonatorum	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	...	1	1	...	1
Pericarditis	..	..	..	..	..	..	..	1	1	..	1	..	..	..	1	1	..	1	1	..	..	..	..	1	3	5	4	4	8
Periostitis Osteo	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	...	1	1	...	1
Peritonitis, Acute	3	3	2	3	4	4	2	7	2	2	2	3	3	5	5	2	1	4	4	6	..	1	3	3	28	46	31	43	74
Tubercular	..	..	..	..	..	..	..	1	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	2	1	2	1	3
Perityphlitis	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1	3	...	2	1	3
Phlebitis	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	2	..	..	1	3	1	2	2	4
Phrenitis	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	...	1
Phthisis	3	7	2	1	8	8	7	4	4	3	1	2	4	..	3	2	5	4	5	..	1	3	1	9	26	61	44	43	87

CAUSES OF DEATH.	Jan.		Feb.		Mar.		April.		May.		June.		July.		Aug.		Sept.		Oct.		Nov.		Dec.		PARENTAGE.		SEX.		Total.
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Am	For.	M.	F.	
Phthisis, Fibroid																			1						1		1		1
Pulmonalis	7	3	4	2	10	4	6	5	5	4	7	5	5	2	3	4	7	5	4	3	8	6	4	2	38	77	70	45	115
Pleurisy	1	1	1		4		2	1	2	3		1						1	1		1		2		9	12	14	7	21
Pleurodinia				1																					1			1	1
Pneumonia	48	46	39	44	57	46	62	42	54	46	31	19	16	12	2	8	13	9	24	20	18	22	48	50	319	457	412	364	776
Prostate Disease									1		1						1								3		3		3
Purpura Hemorrhagica		1		1			1			1			1												1	4	2	3	5
Pyæmia		1	1				1					1			1			1		1		1			7	1	3	5	8
Rachitis					1																					1	1		1
Rheumatism		1	3	1	2	4	2			2		1			2			1		1	1		1	1	5	18	11	12	23
Acute	1	1		1		1	1	1	1	1	1				1		1	1	1				1		8	6	8	6	14
Chronic		1						1													1				1	2	1	2	3
Rubeola							2																			2	2		2
Scarlatina	9	12	7	11	6	7	8	7	11	13	7	12	6	9	3	9	11	13	8	3	3	3	7	8	75	118	86	107	193
Sclerosis, Arterial																		1							1			1	1
Spinal		1											1						1						3		2	1	3
Scrofula		1					1		2	1							2				1			1	4	5	6	3	9
Septicaemia	1	1	2		1	1			1			1						1	1				1		7	4	7	4	11
Shock		1																								1		1	1
Skin Disease, Eczema																								1		1		1	1
Psoriasis							1																		1		1		1
Spina Bifida							1					1			2								1		2	3	4	1	5
Spinal Diseases		1		1																1					2	1		3	3
Stomach Diseases								1													1			3	1	4	1	4	5
Inflammation																						1			1			1	1
Ulceration	1	1	1										1													4	3	1	4

TABLE VII.—CAUSES OF DEATH, 1893.—Continued.

CAUSES OF DEATH.	Jan.		Feb.		Mar.		April		May.		June.		July.		Aug.		Sept.		Oct.		Nov.		Dec.		PARENTAGE.		SEX.		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Am.	For.	M.	F.	Total.
Stomatitis									1																	1	1		1
Stricture of Œsophagus													1					1					1		2	1	2	1	3
of Rectum														1											1			1	1
of Urethra			1																						1		1		1
Suicide by Cutting Throat			1		1									1									1		2	2	3	1	4
by Cyanide of Potassium																	2									2	2		2
by Drowning											1				1										1	1	2		2
by Hanging															2		1		1						1	3	4		4
by Opium								1																	1			1	1
by Paris Green															1										1		1		1
by Poison															1											1	1		1
by Shooting			1		2														1						3	1	4		4
by Suffocation																	1								1		1		1
Unspecified																1										1		1	1
Syphilis									1		2				1		1	1						1	1	6	5	2	7
Congenital		1			1			1				2		1		1	1		1						5	4	3	6	9
Tabes Dorsalis																1										1		1	1
Mesenterica			1		1											1		1						1	2	3	2	3	5
Teething			2		1	1			2				1	1		2		1	2		1		1	1	7	9	10	6	16
Tetanus	1	1			1		1		2												2				5	3	7	1	8
Thrombosis		1																		2					2	1		3	3
Tonsillitis	1	2			1	1			1																2	4	3	3	6
Trichinosis									1																	1	1		1
Tuberculosis	4	3	1	3	7	3	3	2	4	4	3		4	3	4	2	4	3	2	3	2	1	1	2	23	45	39	29	68

CAUSES OF DEATH.	Jan.		Feb.		Mar.		April.		May.		June.		July.		Aug.		Sept.		Oct.		Nov.		Dec.		PARENTAGE.		SEX.		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Am.	For.	M.	F.	Total.
Tuberculosis of Bowels	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	2	1	2	1	3
of Larynx	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	...	1	1
Pulmonary	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	2	..	..	3	3	...	3
Tumor of Abdomen	..	1	1	..	..	..	1	..	..	1	..	..	..	..	..	..	..	1	..	1	..	..	..	1	4	3	2	5	7
of Bladder	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	...	1	...	1
of Brain	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	..	..	..	..	2	1	2	1	3
of Kidney	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	....	1	...	1
of Leg	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	....	1	1	...	1
of Liver	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	1	...	2	2
of Maxillary (Upper)	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	....	1	1	...	1
of Neck	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	....	1	...	1	1
of Omentum	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1	....	..	1	1
of Ovary	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	3	..	..	..	2	..	2	2	7	...	9	9
of Thyroid Gland	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	...	1	1	...	1
of Uterus	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	2	..	..	..	..	..	1	..	1	3	2	...	5	5
of Sacrum	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	1	....	1	..	1
Unspecified	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	....	1	...	1	1
Uræmia	..	..	2	1	..	1	2	..	1	..	..	..	3	2	2	1	1	..	1	..	..	1	..	1	11	8	12	7	19
Uterine Disease	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	....	1	...	1	1
Vomiting	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	2	....	...	2	2
Whooping Cough	..	..	..	1	..	1	..	..	..	1	4	1	..	..	..	2	..	4	1	1	2	1	1	3	9	14	8	15	23
Unknown	3	4	2	..	3	2	2	5	4	2	3	1	3	2	1	4	2	4	5	4	2	4	4	2	33	35	34	34	68

TABLE VIII.—CAUSES OF DEATH, 1893.

Arranged Alphabetically: Showing the Number of each Sex, who died from each Cause, in each Period of Life.

CAUSES OF DEATH.	Under 1.		1 and under 2.		2 to 3.		3 to 5.		5 to 10.		10 to 15.		15 to 20.		20 to 30.		30 to 40.		40 to 50.		50 to 60.		60 to 70.		70 to 80.		80 to 90.		90 and over.		Age not stated.		SEX.		
	M	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Total.
Abortion														2		3		2																7	7
Abscess of Abdomen.					1																												1		1
Brain	1								1		1							2															3	2	5
Cervical Gland																	1																1		1
Kidney																			1					1									1	1	2
Liver									1						1			1								1							2	2	4
Lung																	1								1								2		2
Neck					1																												1		1
Otitis Interna		1																																1	1
Pelvis																		1																1	1
Psoas														1									1										1	1	2
Recto Perineal																							1										1		1
Stomach																							1										1		1
Thigh																					1												1		1
Throat																												1						1	1
Unspecified	1				1														1		1				1								5		5
Accidents, Asphyxia	3	3	1												2		1	1		1	2												9	5	14
Boiler Explosion																	1		1		1												3		3
Burns and Scalds	4			1	1	1	3	2	2	1	1	1	1	1	2	1			2			1					1						17	9	26
Crushed by Weight																					1												1		1
Dislocated Vertebræ															1				1														2		2

CAUSES OF DEATH.	Under 1.		1 and under 2.		2 to 3.		3 to 5.		5 to 10.		10 to 15.		15 to 20.		20 to 30.		30 to 40.		40 to 50.		50 to 60.		60 to 70.		70 to 80.		80 to 90.		90 and over.		Age not stated.		SEX.		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Total.
Accidents, Drowning				1	1	2	1		3	1	6		7		9	1	4	2	4		2	1	1									1	38	9	47
Electric Shock													1																				1		1
Explosion of Powder			1				1										2		1														5		5
Exposure to Cold																	1						1										2		2
Falls	2										1		2				4	1	4			1	3	2	3	1	1						20	5	25
Fractures and Contusions	1			1		1	1			1	1		1				3	1	3		2		1	2	2	2		2					15	10	25
Gunshot Wounds													1																		1		2		2
Injury at Birth	2																																2		2
Inhalation of Foreign Body			1																														1		1
Landslide											1																						1		1
Machinery																							1										1		1
Pistol Wound															1																		1		1
Poisoning by Alcohol									1																								1		1
by Carbolic Acid															1																		1		1
by Lead																							1										1		1
by Oil of Almonds															2																		2		2
by Opium																				1														1	1
by White Drops		1																																1	1
Otherwise	2					1							1				2						1										6	1	7
Railroad									1				1		7	4	10	2	4	1	3	1	3	1							1		30	9	39
Strangulation	1																2						1										4		4
by Foreign Body in Œsophagus	1																																1		1
Suffocation	6	4															1		1	1	1												9	5	14
Surgical Operation	2	3	1															1	1	1	1	1											5	6	11
Run over by Horse Cars						1																												1	1

TABLE VIII.—CAUSES OF DEATH, 1893.—Continued.

CAUSES OF DEATH.	Under 1.		1 and under 2.		2 to 3.		3 to 5.		5 to 10.		10 to 15.		15 to 20.		20 to 30		30 to 40.		40 to 50.		50 to 60.		60 to 70		70 to 80.		80 to 90.		90 and over.		Age not stated.		SEX.		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Total.
Accidents, Various	1			1			1						2		2		2		3		1			2	1		1						14	3	17
Albuminaria														1																				1	1
Alcoholism															5		5	4	7	1	5		2		1	2	2						27	7	34
Anæmia	1	2	1					1				1	1	1		2		2		2	1	2		3	1								5	16	21
Aneurism Aorta																						1												1	1
Abdominal Aorta																	1							1									1	1	2
Unspecified																		1																1	1
Angina Pectoris																	1	1	1		1	1	3	1	1		2						9	3	12
Apoplexy		1	2						1		1		2	1	2	3	5	6	13	15	26	19	29	45	43	25	6	15		2	1		131	132	263
Appendicitis											3	2	1	1	2		1																7	3	10
Ascites		1														1				2			1										1	4	5
Asthenia	3	2								1			1			1		1	1	2	3		4	3	6	3	2	10	1	3			21	26	47
Asthma															1					1	1	2	1	4	2	1							5	8	13
Arterial Sclerosis																				1														1	1
Atelectasis Pulmonum	8	2																						1									8	3	11
Atrophy, Cerebral																										1	1						1	1	2
Bladder Diseases															1	1			1				1		1								4	1	5
Bowel Diseases	3	7										1			1				2	1	2			2	3								11	11	22
Inflammation	1			1					1		1				1			1				2		2		1							4	7	11
Obstruction																									1								1		1
Tuberculosis																				1														1	1
Ulceration			1																														1		1
Brain Diseases	4	3	1			1				1							1	1	2	1			2		2								12	7	19
Congestion	2	1		2						1					1			1		1	2	1				1							5	8	13

CAUSES OF DEATH.	Under 1.		1 and under 2.		2 to 3.		3 to 5.		5 to 10.		10 to 15.		15 to 20.		20 to 30.		30 to 40.		40 to 50.		50 to 60.		60 to 70.		70 to 80.		80 to 90.		90 and over.		Age not stated.		SEX.		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M	F.	M.	F.	M.	F.	M.	F.	M.	F.	M	F.	M.	F.	M.	F.	M.	F.	M.	F.	Total.
Brain Diseases, Inflammation	5	3	1	1	1		1		1	1			1	1						1	1												11	7	18
Softening															1						1	1		2	5	1		2					7	6	13
Bronchitis, Acute	60	47	22	13	1	7	1	5	4	3			2		3	4	3	1	8	3	11	9	13	11	11	14		5		1	1		140	123	263
Chronic	1							1								1	4		4	1	3	4	5	9	3	7	4	3					24	26	50
Calculus																							1		1								2		2
Biliary																				2														2	2
Cancer of Abdomen																				1		1												2	2
Bladder																						1						1						2	2
Bowels																				2				1										3	3
Breast																		3		4		8		7		5								27	27
Face																			1				1		1		2						5		5
Liver																		2	2	5	3	2	2	4	4	1	1	1					12	15	27
Maxillary (Upper)																					1		1		1								3		3
Mesentery																		1										1						2	2
Mouth																					1				1								2		2
Neck																			1	1													1	1	2
Ovaries																										1								1	1
Pancreas																					1												1		1
Prostate																							1										1		1
Pylorus																										1								1	1
Rectum																		1		1		2	1	1	1	1		1					2	7	9
Stomach																1		1	4	3	4	4	4	9	4	6		1					16	25	41
Testicle																											1						1		1
Throat																									1	1							1	1	2
Tongue																					1		2										3		3
Uterus																		6		12		12		8		3		1						42	42

TABLE VIII.—CAUSES OF DEATH, 1893.—Continued.

CAUSES OF DEATH.	Under 1.		1 and under 2.		2 to 3		3 to 5.		5 to 10.		10 to 15.		15 to 20.		20 to 30		30 to 40.		40 to 50.		50 to 60		60 to 70		70 to 80.		80 to 90.		90 and over.		Age not stated.		SEX.		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Total.
Cancer of Vagina																										1								1	1
Vulva																1																		1	1
Unspecified			1												1			2		5		2		8	4	3							6	20	26
Carbuncle																					1				2								3		3
Catarrh																						1		1										2	2
Cellulitis												1																						1	1
Cephalæmatoma	1																																1		1
Cerebritis							1						1						2	1													4	1	5
Childbirth																8		8		2														18	18
Peritonitis																4		2																6	6
Phlegmasia Dolens																1																		1	1
Puerperal Convulsions																3																		3	3
Fever														1		5				1														7	7
Hemorrhage																		2		1														3	3
Mania																		1																1	1
Septicæmia														1		5		1		1														8	8
Uræmic Coma																		1																1	1
Cholera Infantum	249	207	23	25	8	5	1	2	1																								282	239	521
Cholera Morbus	2	4		1	1		2	2	1						1			1	1	1	4	2	3	3	3	2		1					18	17	35
Chorea										1		1		1							1												1	3	4
Chyluria																											1						1		1
Colic																									1								1		1
Consumption	8	7	3	4	2	2		3	3	2	1	5	26	26	71	82	62	63	35	35	23	23	6	7	6	7		3					246	269	515
Convulsions	48	38	15	9	5	1	5	9	4	2					2	2				1						1							79	63	142

CAUSES OF DEATH.	Under 1.		1 and under 2.		2 to 3.		3 to 5.		5 to 10.		10 to 15.		15 to 20.		20 to 30.		30 to 40.		40 to 50.		50 to 60.		60 to 70.		70 to 80.		80 to 90.		90 and over.		Age not stated.		SEX.		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M	F.	M	F.	M.	F.	M.	F.	M.	F.	M.	F.	M	F.	M.	F.	M.	F.	M.	F.	M.	F.	Total.
Coxitis, Acute												1																						1	1
Croup	11	7	6	2	2	4	4	6	4	2	1				1																		29	21	50
Membraneous		2	10	5	5	4	4	4	3	7	2																						24	22	46
Cyanosis	7	3																															7	3	10
Cystitis							1	1			1								2		4		2	1	8		1	1					19	3	22
Debility, General												1	1	1				1		1	2	2	3	2	3	6	1	3	1	2			11	19	30
Infantile	63	49	2	1		2																											65	52	117
Premature Birth	42	43																															43	42	85
Senile																							1	3	2	3	1	2	1	1			5	9	14
Delirium Tremens																			1														1	...	1
Dementia																		1	2	2	1			2		2		1					3	8	11
Agitata																						1			1	2							1	3	4
Senile																							1	1			2	1				1	3	3	6
Dentition	6	3	2																														8	3	11
Diabetes															1	1	2	2	1	2	2	3	1	2	2	3	1						10	13	23
Mellitus									1		1		1			1	2	1		1	2			4		3							7	10	17
Diarrhœa, Acute	32	24	4	5					3				1	1		2	1	1		3			6	4	1	3	2	2			1		51	45	96
Chronic	5	8	1															1			2		1			2	1						10	11	21
Difficult Labor	1																																1	...	1
Diphtheria	6	3	6	12	9	3	14	13	12	23	2	4	1	1	1	1																	51	60	111
Dropsy										2					1	2	1		2	2	1	6	3	10	2	4	1	2					11	28	39
Dysentery	4	6	1	2	2	1	2		2	2				1		1			1		1		4	5		4	1	1					18	23	41
Chronic																		1															...	1	1
Dyspepsia																								1		2							...	3	3
Eclampsia	1	3	1	1			1									1		1															3	6	9
Embolism									1							1				2	2			1			2						5	4	9

TABLE VIII.—CAUSES OF DEATH, 1893.—Continued.

CAUSES OF DEATH.	Under 1.		1 and under 2		2 to 3.		3 to 5.		5 to 10.		10 to 15.		15 to 20.		20 to 30.		30 to 40.		40 to 50		50 to 60.		60 to 70.		70 to 80.		80 to 90.		90 and over.		Age not stated.		SEX.		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Total.
Empyema																1																	...	1	1
Emphysema																			1		2		1										4	...	4
Endocarditis									2							1	1			1			1	3									4	5	9
Enteritis	14	9	7	1		2	1		3	2							1		1	2	1		1	1	4	1	1						34	18	52
Gastro	24	21		3	1			1	1	1						2		1		2		2		2		1	1						27	36	63
Entero-Colitis	8	11	3	3	1		1		3						1									2	1					1			18	17	35
Epilepsy			1							1		1		3			1	1		1	1					1		1					3	9	12
Erysipelas	1	2												1	1	2	2	3	1	1	1	2	1		1	3		1					8	15	23
Exhaustion	3	1				1												1	2		1	1		2	1		1	2					8	8	16
Fever, Gastric														1					1			1											1	2	3
Intermittent		1						1		1											1	1						1					1	5	6
Malarial		1																1								1							...	3	3
Typho													1																				1	...	1
Remittent		1													1						2												3	1	4
Typhoid									3	3	4	3	9	7	22	21	10	5	6	4	7	3	3	3	1	1							65	50	115
Unspecified						1																											...	1	1
Gall Stones																								3					1				1	3	4
Gangrene of Foot																			1			2			1	1							2	3	5
Leg																					1							2					1	2	3
Senile																							1				3						4	...	4
Unspecified								1											1	1			1	1									2	3	5
Gastritis, Acute	2						1	1					1	1	1		2	1	2	1	2	4	3	4	2	2							16	14	30
Chronic																	1			1	1	2	1	2	2	3		3					5	11	16
Goitre																				1													...	1	1

CAUSES OF DEATH.	Under 1.		1 and under 2.		2 to 3.		3 to 5.		5 to 10.		10 to 15.		15 to 20.		20 to 30.		30 to 40.		40 to 50.		50 to 60.		60 to 70.		70 to 80.		80 to 90.		90 and over.		Age not stated.		SEX.		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Total.
Gout																									1								1	...	1
Heart Diseases	8	1	1					2	3	2	1	3	1	4	4	7	3	14	16	19	21	19	30	29	32	27	7	10			1		128	137	265
Dilatation																	1			1			3	1		1		1					4	4	8
Failure	4	2							2				1	1	1	2	5	3	4	6	4	4	3	10	4	6	5		1	1			34	35	69
Fatty Degeneration																	1			1	1	3		3	3	2	1						6	9	15
Hypertrophy															1		1			2			1		1		1						5	2	7
Inflammation										1	1		1		2		1	1	1	2	1	2	2	1		1							9	8	17
Valvular Disease	2								2	1		2	2	1	3	3	5	5	5	5	8	9	11	9	8	8	4	5					50	48	98
Hæmatemesis												1					1																1	1	2
Hæmoptysis																1																	...	1	1
Hemiplegia																				1	1		1	1	2	2	1						5	4	9
Hemorrhage, Cerebral																				1	1	2	3	1	2	2		1					6	7	13
from Bowels																			1			1											1	1	2
from Lungs															1	1	1		1	1	3		2		1								9	2	11
from Stomach																										1							...	1	1
from Umbilicus	4	1																															4	1	5
from Uterus																				2													...	2	2
Unspecified	1	1															1	1	1			1											3	3	6
Hepatitis	1																1			2	1	1	1	3	2		1	1					7	7	14
Hernia	2												1		1				1		1			2	1	1				1			7	4	11
Umbilical		2																				1				1							...	4	4
Hip Disease											1																						1	...	1
Homicide	2																1																3	...	3
Hydrocephalus	11	9	4	3		1			1	2																							16	15	31
Hyperæmia, Cerebral																				1													...	1	1
Hysterectomy																				1													...	1	1

TABLE VIII.—CAUSES OF DEATH, 1893.—Continued.

CAUSES OF DEATH.	Under 1.		1 and under 2.		2 to 3.		3 to 5.		5 to 10.		10 to 15.		15 to 20.		20 to 30.		30 to 40.		40 to 50.		50 to 60.		60 to 70.		70 to 80.		80 to 90.		90 and over.		Age not stated.		SEX.		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Total.
Icterus Neonatorum	4																																		4	...	4
Inanition	21	7																1	1																22	8	30
Indigestion	9	13	2	2	1	1		1															1	2				1							13	20	33
Influenza	3	4	2	3			2	1		1		1	1	1	6			1	3	4	1	3	3	10	4	12	8	8	1	1		1			34	51	85
Innutrition	2	1																																	2	1	3
Insanity																				2	2	1	1	1	2			2							5	6	11
Insolation								1																											...	1	1
Intemperance															1		1	1	2	2	1										1				6	3	9
Intestinal Obstruction																	1																		1	...	1
Intussusception	2									1			1							1		1				2	1	1							4	6	10
Invagination																							1												1	...	1
Jaundice	2	2														1										1									2	4	6
Kidney Disease	1	1															1	1		1	1	2	2	2	6	3	1								12	10	22
Bright's Disease		1								1	1	1	2	3	9	8	3	12	8	11	9	18	20	16	15	6	2	2	1						70	79	149
Laparotomy																		1		1															...	2	2
Laryngitis	1	1				2				1							1																		2	4	6
Leucocythaemia						1																	1												1	1	2
Liver Disease										1			1				1			1	2	2	2	2	1	1									7	7	14
Amyloid Degeneration																					1														1	...	1
Atrophy																		1																	...	1	1
Cirrhosis															3	1	5	1	4	6	5	2	6	2	2	2	1								26	14	40
Hypertrophy				1																		1	1												1	2	3
Inflammation																1					1														1	1	2
Locomotor Ataxia																	1		1	1			1												3	1	4

CAUSES OF DEATH.	Under 1.		1 and under 2.		2 to 3.		3 to 5.		5 to 10.		10 to 15.		15 to 20.		20 to 30.		30 to 40.		40 to 50.		50 to 60.		60 to 70.		70 to 80.		80 to 90.		90 and over.		Age not stated.		SEX.		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Total.
Lung Diseases		1			1									1			1																2	2	4
Gangrene																		1				1												2	2
Œdema	1																1			1	1			2		1							3	4	7
Lymphangitis									1																								1		1
Malaria					1								1			1	1	1						1									3	3	6
Malformation of Anus	2	1																															2	1	3
of Bile Ducts	1																																1		1
of Heart (Foramen Ovale)	7	3																															7	3	10
of Palate		1																																1	1
Unspecified	2				1										1																		4		4
Malignant Pustule																1																		1	1
Malnutrition	8	10					1																										9	10	19
Mania, Acute																					1	1			1							1	2	2	4
Chronic																								1										1	1
Marasmus	34	34	3	1	1	1			2												1		1										42	36	78
Senile																								1	2		1	1	1				4	2	6
Measles	15	15	21	13	3	6	8	5	5	5	2		1		1																		56	44	100
Melancholia																1																		1	1
Meningitis	17	16	5	16	4	2	9	3	11	6	1	3	2		7	5			1	1	2	4	2	1		2							61	59	120
Cerebro-Spinal	8	3	4	1	1	2	1	3	3	2	2	1	1	2	2	1			3								1						26	15	41
Spinal	1	7	3		2		1			2							1	1			1			1									9	11	20
Tubercular	6	4	3	3			1		3							1		1															13	9	22
Menopause																						1												1	1
Metritis																		1																1	1
Myelitis															1	1				2	2												3	3	6
Necrosis of Humerus										1																								1	1

TABLE VIII.—CAUSES OF DEATH, 1893.—Continued.

CAUSES OF DEATH.	Under 1.		1 and under 2.		2 to 3.		3 to 5.		5 to 10.		10 to 15.		15 to 20.		20 to 30.		30 to 40.		40 to 50.		50 to 60.		60 to 70.		70 to 80.		80 to 90.		90 and over.		Age not stated.		SEX.		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Total.
Necrosis of Jaw																									1								1		1
of Spine															1																		1		1
of Tibia																								1										1	1
Nephritis	1	1					3		1	1	1				5	5	7	7	7	4	13	14	9	9	10	7	1	1		1			58	50	108
Nervous Prostration																						1												1	1
Neuritis																	1																1		1
Obstipation	1																								2								3		3
Œdema Glottidis																1																		1	1
Old Age																							4	8	15	27	40	54	13	22			72	111	183
Opium Habit															1							1				1							1	2	3
Otitis Media																			1														1		1
Ovaritis																				1														1	1
Paralysis		1	1		1	1			1							1	4	2	6	2	6	3	13	12	14	13	7	9		2			53	46	99
Paraplegia																				1		1			1								1	2	3
Paresis																	1		2	2	1	1	2	2	1	3							7	8	15
Pemphigus Neonatorum	1																																1		1
Pericarditis																		1	1		1	1	1	1			1	1					4	4	8
Periostitis Osteo											1																						1		1
Peritonitis, Acute	2	1	1						3	2	1	1	5	3	6	9	3	10	6	8	2	5	1	2	1	2							31	43	74
Tubercular		1							1						1																		2	1	3
Perityphlitis									1													1					1						2	1	3
Phlebitis													1									1			1	1							2	2	4
Phrenitis							1																										1		1
Phthisis			1					1			1	2	2	8	18	13	9	7	10	8	3	2				1		1					44	43	87

CAUSES OF DEATH.	Under 1.		1 and under 2.		2 to 3.		3 to 5.		5 to 10.		10 to 15.		15 to 20.		20 to 30.		30 to 40.		40 to 50.		50 to 60.		60 to 70.		70 to 80.		80 to 90.		90 and over.		Age not stated.		SEX.		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Total.
Phthisis, Fibroid																					1												1		1
Pulmonalis						1						1	4	6	27	8	16	14	12	4	4	6	3		4	3		1				1	70	45	115
Pleurisy				1	1							1		2			3	1	5	1	2		1	1			1				1		14	7	21
Pleurodinia																								1										1	1
Pneumonia	51	47	20	13	14	6	14	11	17	8	3	5	6	11	22	27	45	23	56	40	63	52	41	61	34	36	24	23	2	1			412	364	776
Prostate Disease																							1		1				1				3		3
Purpura Hemorrhagica		1																1	1				1			1							2	3	5
Pyæmia									1		1							1		1		1		1	1			1					3	5	8
Rachitis					1																												1		1
Rheumatism											2	2		2	1	1	4	1	1		1	2	2	2		1		1					11	12	23
Acute		1							1	1			1		3		2	3		1			1										8	6	14
Chronic																	1					1		1									1	2	3
Rubeola	1				1																												2		2
Scarlatina	5	5	17	13	13	14	18	21	22	37	5	11	2	1	2	3	2	2															86	107	193
Sclerosis, Arterial																								1										1	1
Spinal																					1				1	1							2	1	3
Scrofula	2	1		1	1				2						1	1																	6	3	9
Septicæmia	1						1				1				1	1		2	1		1			1			1						7	4	11
Shock																1																		1	1
Skin Disease, Eczema		1																																1	1
Psoriasis																							1										1		1
Spina Bifida	4	1																															4	1	5
Spinal Diseases																1						1		1										3	3
Stomach Diseases	1																	1		2						1							1	4	5
Inflammation		1																																1	1
Ulceration																		1	1				2										3	1	4

TABLE VIII.—CAUSES OF DEATH, 1893.—Continued.

CAUSES OF DEATH.	Under 1.		1 and under 2.		2 to 3.		3 to 5.		5 to 10.		10 to 15.		15 to 20.		20 to 30.		30 to 40.		40 to 50		50 to 60.		60 to 70.		70 to 80.		80 to 90.		90 and over.		Age not stated.		SEX.		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M	F.	M.	F.	Total.
Stomatitis	1																																1		1
Stricture of Œsophagus							1					1									1												2	1	3
of Rectum																		1																1	1
of Urethra																							1										1		1
Suicide by Cutting Throat																		1	1				2										3	1	4
by Cyanide of Potassium																			1				1										2		2
by Drowning																			1						1								2		2
by Hanging																	1				1		2										4		4
by Opium																1																		1	1
by Paris Green																											1						1		1
by Poison																	1																1		1
by Shooting													1						1		1						1						4		4
by Suffocation																					1												1		1
Unspecified																1																		1	1
Syphilis														2			2		1		1		1										5	2	7
Congenital	3	5		1																													3	6	9
Tabes Dorsalis																						1												1	1
Mesenterica	1	2								1			1																				2	3	5
Teething	9	5	1	1																													10	6	16
Tetanus	4																				2	1	1										7	1	8
Thrombosis																2										1								3	3
Tonsillitis	1	1		1	1					1			1																				3	3	6
Trichinosis																	1																1		1
Tuberculosis	6	6	3			1	1		1			2	3	4	10	5	8	6	5	2	1	2		1	1								39	29	68

CAUSES OF DEATH.	Under 1.		1 and under 2.		2 to 3.		3 to 5.		5 to 10.		10 to 15.		15 to 20.		20 to 30.		30 to 40.		40 to 50.		50 to 60.		60 to 70.		70 to 80.		80 to 90.		90 and over.		Age not stated.		SEX.		
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	Total.
Tuberculosis of Bowels	1										1							1															2	1	3
of Larynx																										1								1	1
Pulmonary															2		1																3		3
Tumor of Abdomen																			1			2	1	1				2					2	5	7
of Bladder																									1								1		1
of Brain											1							1			1												2	1	3
of Kidney							1																										1		1
of Leg																							1										1		1
of Liver																		1				1												2	2
of Maxillary (Upper)																			1														1		1
of Neck																						1												1	1
of Omentum																										1								1	1
of Ovary																		2		1		4		1		1								9	9
of Thyroid Gland																					1												1		1
of Uterus																1		2		1		1												5	5
of Sacrum																							1										1		1
Unspecified								1																										1	1
Uræmia													1		1	1		3	4			3	4		2								12	7	19
Uterine Disease																		1																1	1
Vomiting														1				1																2	2
Whooping Cough	4	8	1	2	1	3	1	1	1	1																							8	15	23
Unknown	10	18	1	1	1	2			2	1		1	1		4		2	2	4		2	1	2	5	4	2	1	1					34	34	68

Table IX.—CLASSIFICATION AND PERCENTAGE, 1893.

Ratio of Mortality in the State, and in each Division, ascribed to each Cause and Class of Causes.

Number of Deaths in each Division of the State.												Percentage of Deaths in each Division.									
Bristol County.	Kent County.	Newport Co. Towns.	Newport City.	Providence County Towns.	Pawtucket.	Providence City.	Woonsocket.	Washington County.	Whole State.	CAUSES OF DEATH.	Percentage in the Whole State.	Washington County.	Woonsocket.	Providence City.	Pawtucket.	Providence County Towns.	Newport City.	Newport County Towns.	Kent County.	Bristol County.
228	578	144	370	1,635	599	3,141	438	307	7,440	All Causes	100.00	100.00	100 00	100.00	100.00	100 00	100.00	100.00	100 00	100.00
227	572	136	370	1,614	586	3,127	434	306	7,372	Causes Specified	99.09	99.67	99.09	99.55	97 83	98.72	100.00	94.44	98.96	99.56
1	6	8	...	21	13	14	4	1	68	Causes Unspecified	.91	33	.91	.45	2.17	1.28	......	5.56	1.04	.44
										CLASSES.										
40	177	27	78	390	162	663	111	55	1,703	I. Zymotic Diseases	22.89	17.91	25.34	21.11	27.05	23.85	21.08	18.75	30.62	17.54
35	85	13	59	262	76	524	87	52	1,193	II. Constitutional Diseases	16.04	16.94	19.86	16.68	12.69	16.03	15.95	9.03	14.71	15.35
125	220	62	169	749	251	1,541	157	158	3,432	III. Local Diseases	46.13	51.47	35.85	49.06	41.91	45.81	45.68	43.06	38.06	54.82
18	62	26	50	149	80	248	65	27	725	IV. Developmental Diseases	9.74	8.79	14.84	7.90	13.34	9.11	13 51	18 05	10.73	7.90
10	34	16	14	85	30	165	18	15	387	V. Violence and Otherwise	5.20	4.89	4.11	5.25	5.01	5.20	3.78	11.11	5.88	4.39
										ORDERS.										
										Class I.										
37	170	24	65	363	159	618	109	46	1,591	Miasmatic	21.39	14.98	24.88	19.68	26.55	22.20	17.57	16.67	29.41	16.23
1	3	...	2	7	...	11	1	4	29	Enthetic	.39	1.30	.23	.35	...	.43	.54	......	.52	.44
2	4	3	11	20	3	33	1	5	82	Dietic	1.10	1.63	.23	1 05	.50	1.22	2.97	2.08	.69	.87
...	...	...	...	...	...	1	...	...	1	Parasitic	01	......	.....	.03	......	.....	.....	.....	.....	.....

										Class II.										
17	24	7	23	65	24	120	24	21	325	Diathetic	4.37	6.84	5.48	3.82	4.01	3.98	6.22	4.86	4.15	7.46
18	61	6	36	197	52	404	63	31	868	Tubercular	11.67	10.10	14.38	12.86	8.68	12.05	9.73	4.17	10.56	7.89
										Class III.										
38	68	14	52	233	54	344	56	32	891	Dis. of Nervous System	11.97	10.42	12.79	10.95	9.02	14.25	14.05	9.72	11.76	16.67
20	43	10	20	120	39	238	15	30	535	Dis. of Circulatory System	7.19	9.77	3.42	7.58	6.51	7 34	5.41	6.94	7.44	8.77
28	51	22	56	251	99	551	56	50	1,164	Dis. of Respiratory Organs	15.64	16.29	12 79	17.54	16.53	15.35	15.14	15.28	8 82	12.28
14	31	10	15	74	30	213	16	21	424	Dis. of Digestive Organs	5.70	6.84	3.65	6.78	5.01	4.53	4.05	6.94	5.36	6.14
23	22	6	24	63	25	177	13	24	377	Dis. of Urinary Organs	5.07	7.82	2.97	5.64	4.18	3.85	6.49	4.17	3.81	10.08
1	3	...	1	3	2	10	...	...	20	Dis. of Reproductive Organs	.27	...	...	.32	.33	.18	.27	...	.52	.44
1	...	..	1	4	2	6	..	...	14	Dis. of Os. and Locomo. System	.19	...	...	.19	.33	.25	.27	...	...	...
...	2	...	...	1	...	1	1	...	5	Dis. of Integumentary System	.07	...	.23	.03	...	.06	...	...	.35	.44
...	...	...	...	...	...	1	...	1	2	Dis. of Org. of Hearing and Sight	.03	.33	...	.03	...	...	...	...	...	...
										Class IV.										
4	29	9	6	59	19	122	49	4	301	Developmental Dis. of Children	4.05	1.30	11.19	3.89	3.17	3.61	1.62	6.25	5.02	1.76
...	4	1	2	9	2	26	2	4	50	Developmental Dis. of Women	.67	1.30	.45	.83	.33	.55	.54	.69	69	...
8	16	6	13	46	39	33	7	15	183	Developmental Dis. of Old Age	2 46	4.89	1.60	1.05	6.51	2.81	3.51	4.17	2.77	3.51
6	13	10	29	35	20	67	7	4	191	Developmental Dis. of Nutrition	2.56	1.30	1.60	2.13	3.33	2.14	7.84	6.94	2.25	2.63
										Class V.										
9	21	8	13	51	13	126	11	12	264	Accident and Negligence	3.55	3.91	2.51	4.01	3.17	3.12	3.51	5.55	3.63	3.95
...	...	...	...	1	...	2	...	...	3	Homicide	.04	...	...	.06	...	06	...	...	...	...
...	2	...	...	2	3	12	2	...	21	Suicide	.28	...	.46	.38	.50	.12	...	...	.35	...
1	11	8	1	31	14	25	5	3	99	Otherwise	1.33	.98	1 14	.80	2.34	1.90	.27	5.55	1.90	.44
										Class I.—Zymotic.										
										Order One.—Miasmatic Diseases.										
...	...	...	...	1	...	2	...	...	3	Carbuncle	.04	...	...	.06	...	.06	...	...	...	...
11	82	8	36	161	45	183	61	16	603	Cholera Infantum	8.11	5.21	13.93	5.83	7.51	9.85	9.73	5.56	14.17	4.82
3	4	...	1	9	2	12	3	1	35	Cholera Morbus	.47	.33	.68	.38	.33	.55	.27	...	.69	1.32
4	11	...	3	18	2	7	5	...	50	Croup (Pseudo Membranous)	.67	...	1.14	.22	.33	1.10	.81	...	1 90	1 76

TABLE IX.—CLASSIFICATION AND PERCENTAGE, 1893.—Continued.

Number of Deaths in each Division of the State. Bristol County.	Kent County.	Newport Co. Towns.	Newport City.	Providence County Towns.	Pawtucket.	Providence City.	Woonsocket.	Washington County.	Whole State.	CAUSES OF DEATH.	Percentage in the Whole State.	Percentage of Deaths in each Division. Washington County.	Woonsocket.	Providence City.	Pawtucket.	Providence County Towns.	Newport City.	Newport County Towns.	Kent County.	Bristol County.
3	12	3	3	20	18	45	10	3	117	Diarrhœa	1.57	.98	2.28	1.43	3.01	1.22	.81	2.08	2.08	1.32
1	11	4	9	30	33	65	4	...	157	Diphtheria	2.11	...	.91	2.07	5.51	1.83	2.43	2.78	1 90	.44
2	2	1	...	6	3	21	3	4	42	Dysentery	.57	1.30	.68	.67	.50	.37	...	.69	.35	.87
...	2	...	...	5	2	16	4	2	31	Erysipelas	.42	.65	.91	.51	.33	.31	...	...	.35	...
...	...	...	...	...	...	2	..	1	3	Fever, Gastric	.04	.33	...	.06	...	...	...	...	...	...
...	...	...	...	2	3	1	...	...	6	Fever, Intermittent	.08	...	...	.03	.50	.12	...	...	...	...
...	...	...	...	2	2	5	...	1	10	Fever, Malarial	.13	.33	...	.16	.33	.12	...	...	...	...
...	1	...	1	2	...	...	...	...	4	Fever, Remittent	.05	...	...	...	...	.12	.27	...	.17	...
4	7	2	3	21	13	52	6	7	115	Fever, Typhoid	1 55	2.28	1.38	1.66	2.17	1.28	.81	1.39	1 21	1.76
...	...	...	...	...	...	1	...	...	1	Fever, Unspecified	.01	...	...	.03	...	...	...	...	...	...
7	3	2	3	17	13	32	3	5	85	Influenza (Epidemic)	1.14	1 62	.68	1.02	2.17	1.04	.81	1.39	.52	3.07
...	11	...	...	13	7	64	2	3	100	Measles	1.35	.98	.46	2.04	1.17	.80	...	...	1.90	...
...	1	...	1	1	...	3	1	...	7	Metria (Puerperal Fever)	.09	...	.23	.10	...	.06	.27	...	.17	...
1	..	1	3	5	2	7	2	2	23	Pertussis	.31	.65	.46	.22	.33	.31	.81	.69	...	.44
...	..	2	...	1	...	3	...	...	6	Tonsillitis	.08	...	...	.10	...	.06	...	1.39	...	...
1	23	1	2	49	14	97	5	1	193	Scarlatina	2.60	.33	1.14	3.09	2.34	3.00	.54	.69	3.98	.44
										Order Two.—Enthetic Diseases.										
...	...	...	...	...	...	...	...	1	1	Gonorrhœa	.01	.33	...	...	...	...	...	...	...	...
...	...	...	...	...	...	1	...	...	1	Malignant Pustule	.01	...	...	.03	...	...	...	...	...	...
1	1	..	2	2	...	2	1	2	11	Septicæmia	.15	.65	.23	.06	...	,12	.54	...	.17	.44
...	2	..	...	5	...	8	...	1	16	Syphilis	.22	.33	...	.26	...	.31	...	...	.35	...

										Order Three.—Dietic Diseases.										
...	3	2	5	7	2	22	...	2	43	Alcoholism	.58	.65	.....	.70	.33	.43	1.35	1.39	.52	.....
...	...	...	...	...	...	1	..	...	1	Delirium Tremens	.01	...	...	.03	...	...	...	...	...	...
...	1	1	6	11	1	8	1	1	30	Inanition	.40	.33	23	.26	.17	.67	1.62	.69	.17	.87
2	...	...	...	...	...	1	...	...	3	Opium Habit	.04	...	...	.03	...	...	...	...	...	...
...	...	...	...	2	...	1	...	2	5	Purpura and Scurvy	.07	.65	...	.03	...	.12	...	...	...	...
										Order Four.—Parasitic Diseases.										
...	...	...	...	...	...	1	...	...	1	Worms, etc.	.01	...	...	.03	...	...	...	...	...	...
										CLASS II.—CONSTITUTIONAL.										
										Order One.—Diathetic Diseases.										
1	1	1	3	7	1	7	2	...	23	Anaemia	.31	...	.46	.22	.17	.43	.81	.69	.17	.44
1	6	2	6	12	3	30	..	8	68	Cancer, Various	.91	2.60	...	.95	.50	.73	1.62	1.39	1.04	.44
...	...	1	1	6	1	11	4	3	27	Cancer of Breast	.36	.98	91	.35	.17	.37	.27	.69	...	...
..	2	..	2	4	3	12	..	4	27	Cancer of Liver	.36	1.30	...	.38	.50	.25	.54	...	.35	...
3	2	1	2	6	4	19	3	1	41	Cancer of Stomach	.55	.33	.68	.61	.67	.37	.54	.69	.35	1.32
2	5	...	2	6	3	20	1	3	42	Cancer of Uterus	.57	.98	.23	.61	.50	.37	.54	...	.86	.87
5	5	1	1	8	3	4	11	1	39	Dropsy	.53	.33	2.51	.13	.50	.49	.27	.69	.86	2.19
...	...	...	...	...	...	1	...	...	1	Gout	.01	...	...	.03	...	...	...	...	...	...
...	3	..	1	6	...	7	..	...	17	Mortification (Gangrene)	23	...	...	.22	...	.37	.27	...	.52	...
5	...	1	5	10	6	9	3	1	40	Rheumatism	.54	.33	.68	.29	1.00	.61	1.35	.69	...	2.19
										Order Two.—Tubercular Diseases										
...	2	...	1	8	2	16	1	1	31	Hydrocephalus	.42	.33	.23	.51	.33	.49	.27	...	.35	...
18	55	6	29	162	40	328	57	27	722	Phthisis (Pulmonalis)	9.72	8.79	13.01	10.44	6.68	9.91	7.84	4.17	9.51	7.89
...	2	..	1	4	..	3	2	1	13	Scrofula	.17	.33	.46	.10	...	.25	.27	...	.35	...
...	...	...	...	1	1	6	...	...	8	Tabes Mesenterica	.10	...	...	.19	.17	.06	...	...	...	...
...	...	...	...	3	2	16	1	...	22	Tubercular Meningitis	.29	...	.23	.51	.33	.18	...	...	...	...
...	2	...	5	19	7	35	2	2	72	Tuberculosis	.97	.65	.46	1.11	1.17	1.16	1.35	...	.35	...
										CLASS III.—LOCAL.										
										Order One.—Diseases of the Nervous System.										
11	20	4	15	49	20	127	11	19	276	Apoplexy	3.71	6.18	2.51	4.01	3.31	3.00	4.05	2.78	3.46	4.82
...	...	...	1	3	...	1	...	...	5	Cerebritis	.07	...	...	.03	...	.18	.27	...	...	...

TABLE IX.—CLASSIFICATION AND PERCENTAGE, 1893.—Continued.

Number of Deaths in each Division of the State.										CAUSES OF DEATH.	Percentage of Deaths in each Division.									
Bristol County.	Kent County.	Newport Co. Towns.	Newport City.	Providence County Towns.	Pawtucket.	Providence City.	Woonsocket.	Washington County.	Whole State.		Percentage in the Whole State.	Washington County.	Woonsocket.	Providence City.	Pawtucket.	Providence County Towns.	Newport City.	Newport County Towns.	Kent County.	Bristol County.
...	3	...	...	1	...	...	...	...	4	Chorea	.05	...	...	...	...	.06	...	...	.52	...
2	17	4	7	34	14	55	17	1	151	Convulsions	2.03	.33	3.88	1.75	2.34	2.08	1.89	2.78	2.91	.87
4	14	2	19	44	12	75	8	4	182	Encephalitis	2.45	1.30	1.83	2.39	2.00	2.69	5.14	1.39	2.42	1.76
2	1	..	1	1	2	5	...	..	12	Epilepsy	.16	...	...	.16	.33	.06	.27	...	.17	.87
...	...	...	...	30	...	9	...	...	39	Insanity	.53	...	...	.29	...	1.84	...	...	...	...
10	8	3	4	47	4	44	7	4	131	Paralysis	1.76	1.30	1.60	1.40	.67	2.88	1.08	2.08	1.38	4.39
1	2	1	1	...	..	2	...	1	8	Tetanus	.10	.33	...	.06	...	...	.27	.69	.35	44
8	3	...	2	21	2	23	13	3	75	*Brain Diseases*	1 01	.98	2.97	.73	.33	1.28	.54	...	.52	3.51
...	...	...	2	3	...	3	...	...	8	*Nerve Diseases*	.10	...	...	.10	...	.18	.54	...	...	...
										Order Two.—Diseases of the Circulatory System.										
...	...	...	...	2	...	2	...	...	4	Aneurism	.05	...	...	.06	...	.12	...	...	...	...
...	...	...	2	7	3	4	...	1	17	Pericarditis	.23	.33	...	.13	.50	.43	.54	...	...	...
20	43	10	18	111	36	232	15	29	514	*Heart Diseases*	6.90	9.44	3.42	7.39	6.01	6.79	4.87	6.91	7.44	8.77
										Order Three.—Diseases of the Respiratory Organs.										
3	...	...	1	3	2	6	2	...	17	Asthma	.23	...	.46	.19	.33	.18	.27	...	...	1.32
4	8	1	15	61	49	101	19	5	263	Bronchitis, Acute	3 54	1.62	4 34	3 21	8.18	3.73	4.05	.69	1.38	1.76
...	1	...	5	15	2	25	4	...	52	Bronchitis, Chronic	.70	...	.91	.80	.33	.91	1.35	...	.17	...
...	...	...	1	1	...	4	...	1	7	Laryngitis	.09	.33	...	.13	...	.06	.27	...	...	...

2	...	...	2	5	4	9	...	...	22	Pleurisy	.29	...	...	.29	.67	.31	.54	...	...	.87
18	42	20	29	160	41	392	31	43	776	Pneumonia	10.43	14.01	7.08	12.48	6.85	9.79	7.84	13.89	7.27	7.89
1	...	1	3	6	1	14	...	1	27	*Lung Diseases*	.36	.33	...	.44	.17	.37	.81	.69	...	.44
										Order Four.—Diseases of the Digestive Organs.										
1	...	1	...	...	1	2	...	...	5	Ascites	.07	...	...	.06	.17	...	...	.69	...	.44
...	2	2	1	12	2	43	4	2	68	Enteritis	.91	.65	.91	1.36	.33	.73	.27	1.39	.35	...
...	...	...	...	...	...	1	...	...	1	Fistula	.01	...	...	.03	...	...	...	...	...	...
1	3	1	4	6	5	25	1	1	47	Gastritis	.63	.33	.23	.80	.84	.37	1.08	.69	.52	.44
1	...	1	1	1	...	8	...	2	14	Hepatitis	.19	.65	...	.26	...	.06	.27	.69	...	.44
2	...	...	...	6	1	6	...	...	15	Hernia	.20	...	...	.19	.17	.37	...	...	...	.87
...	1	...	1	4	...	8	1	1	16	Ileus	.22	.33	.23	.26	...	.25	.27	...	.17	...
...	1	...	...	1	...	...	...	1	3	Intestines, Stricture of	.04	.33	...	...	...	.06	...	...	.17	...
...	1	...	...	1	...	6	...	3	11	Intussusception	.15	.98	...	.19	...	.06	...	...	.17	...
...	1	...	...	2	...	5	...	2	10	Jaundice	.13	.65	...	.16	...	.12	...	...	.17	
3	6	3	3	9	9	30	7	4	74	Peritonitis	1.00	1.30	1.60	.95	1.50	.55	.81	2.08	1.04	1.32
2	6	...	1	17	7	36	1	1	71	*Bowel Diseases*	.95	.33	.23	1.15	1.17	1.04	.27	...	1.04	.87
4	8	2	4	10	3	36	2	3	72	*Liver Diseases*	.97	.98	.46	1.15	.50	.61	1.08	1.39	1.38	1.76
...	2	...	...	5	2	7	...	1	17	*Stomach Diseases*	.23	.33	...	.22	.33	.31	...	...	.35	...
										Order Five.—Diseases of the Urinary Organs.										
...	...	...	...	3	...	3	...	...	6	*Bladder Diseases*	.08	...	...	.10	...	.18	...	...	...	...
...	...	...	...	2	...	2	...	...	4	Calculus (Gravel, etc.)	.05	...	...	.06	...	.12	...	...	...	...
2	2	1	4	5	1	5	1	1	22	Cystitis	.29	.33	.23	.16	.17	.31	1.08	.69	.35	.87
2	5	...	...	3	3	19	1	7	40	Diabetes	.54	2.28	.23	.61	.50	.18	...	...	.86	.87
3	3	3	...	14	4	15	1	1	44	*Kidney Diseases*	.59	.33	.23	.48	.67	.86	...	2.08	.52	1.32
5	...	...	9	11	4	72	4	3	108	Nephritis	1.46	.98	.91	2.29	.67	.67	2.43	...	...	2.19
11	12	2	11	24	13	60	6	11	150	Nephria (Bright's Disease)	2.02	3.58	1.37	1.91	2.17	1.47	2.97	1.39	2.08	4.82
...	...	...	...	1	...	1	...	1	3	Prostate, Disease of	.04	.33	...	.03	...	.06	...	...	...	...
										Order Six.—Diseases of the Generative Organs. Female.										
1	...	...	1	1	1	5	...	...	9	Ovarian Dropsy	.12	...	...	.16	.17	.06	.27	...	...	.44
...	3	...	...	2	1	5	...	...	11	*Diseases of Uterus*	.15	...	...	.16	.17	.12	...	...	.52	...

Table IX.—CLASSIFICATION AND PERCENTAGE, 1893.—Continued.

Number of Deaths in each Division of the State.												Percentage of Deaths in each Division.								
Bristol County.	Kent County.	Newport Co. Towns.	Newport City.	Providence County Towns.	Pawtucket.	Providence City.	Woonsocket.	Washington County.	Whole State.	CAUSES OF DEATH.	Percentage in the Whole State.	Washington County.	Woonsocket.	Providence City.	Pawtucket.	Providence County Towns.	Newport City.	Newport County Towns.	Kent County.	Bristol County.
										Order Seven.—Osseous and Locomotory System.										
...	...	...	...	2	..	3	...	...	5	Bones, Diseases of	.07	...	...	.10	...	.12	...	...	...	...
...	...	...	...	...	1	1	...	...	2	*Joint Diseases*	.03	...	...	.03	.17	...	...	...	...	...
1	...	...	1	2	1	2	...	...	7	Vertebræ, Diseases of	.09	...	...	.06	.17	.12	.27	...	...	.44
										Order Eight.—Integumentary System.										
...	2	...	...	1	...	1	1	...	5	*Skin Diseases*	.07	...	.23	.03	...	.06	...	...	.35	...
										Order Nine.—Organs of Special Sense. Eye and Ear.										
...	...	...	...	...	...	1	...	1	2	Otitis	.03	.33	...	.03	...	...	...	...	...	...
										Class IV.—Developmental.										
										Order One.—Developmental Diseases of Children.										
...	1	...	...	4	2	12	...	2	21	Cyanosis	.28	.65	...	.38	.33	.25	...	...	.17	...
1	12	6	...	25	8	22	41	2	117	Debility, Infantile	1.58	.65	9.36	.70	1.34	1.52	...	4.17	2.08	.44
1	7	...	4	17	7	44	5	...	85	Debility, Premature Birth	1.14	...	1.14	1.41	1.17	1.04	1.08	...	1.21	.44
...	...	1	1	4	...	16	...	...	22	Innutrition	.29	...	...	.51	...	.25	.27	.69	...	...
...	2	1	...	...	...	2	...	...	5	Spina Bifida	.07	...	...	.06	...	...	...	.69	.35	...
2	6	...	1	5	...	10	3	...	27	Teething	.36	...	.68	.32	...	.31	.27	...	1.04	.87

...	1	...	...	4	2	12	...	...	19	Other Malformations....	.26	.....	.....	.38	.33	.25	.....	.....	.17	...
..	...	1	...	.....	...	4	...	..	5	Hemorrhage (Umbilical)..........	.07	.....	.....	.13	.....	.....	.....	.69	.....	.....
										Order Two.—Developmental Diseases of Women.										
..	4	1	2	9	2	26	2	4	50	Childbirth......................	.67	1.30	.46	.83	.33	.55	.54	.69	.69	.....
										Order Three.—Developmental Diseases of Old People.										
8	16	6	13	46	39	33	7	15	183	Old Age.........	2.46	4.89	1.60	1.05	6.51	2 81	3.51	4 17	2.77	3.51
										Order Four.—Diseases of Nutrition. Adolescent and Adult.										
3	8	1	11	15	4	40	2	...	84	Atrophy.......................	1.13	.....	.46	1.27	.67	.92	2.97	.69	1 38	1.32
3	5	9	18	20	16	27	5	4	107	Debility......................	1.43	1.30	1.14	.86	2.66	1.22	4.87	6.25	.86	1.32
										CLASS V.—VIOLENT DEATHS.										
										Order One.—Accident or Negligence.										
1	2	...	1	4	...	14	4	..	26	Burns and Scalds.	.35	.....	.91	.45	....	.25	.27	.....	.35	.41
1	4	7	4	11	2	14	1	3	47	Drowning	.63	.98	.23	.45	.33	.67	1.08	4.86	.69	.41
1	2	...	...	4	...	16	..	2	25	Falls..........................	.34	.65	.....	.51	.....	.25	.....	.....	.35	.44
2	2	..	1	4	1	12	...	3	25	Fractures and Contusions...	.34	.98	.....	.38	.17	.25	.27	.....	.35	.87
2	..	...	...	1	3	8	...	...	14	Poison...............	.19	.....	.....	.26	.50	.06	.....	.....	...	.87
...	2	...	...	15	3	15	4	...	39	Railroad.......................	.52	.....	.91	.47	.50	.91	.....	.....	.35	.....
2	1	...	...	2	1	8	...	...	14	Suffocation....................	.19	.....	.....	.26	.17	.12	.....	...	.17	.87
...	8	1	7	10	3	39	2	4	74	Various and Otherwise..........	.99	1.30	.46	1 23	.50	.61	1.89	.69	1.38	.....
..	..	...	...	1	...	2	...	..	3	*Order Two.—Homicide.*	.04	.....	.....	.06	.....	.06	.....	.....	.....	.....
...	2	...	...	2	3	12	2	...	21	*Order Three.—Suicide.*	.28	.....	.46	.38	.50	.12	.....	.....	.35	.....
										Order Four.—Various.										
...	5	...	1	10	1	11	1	2	31	Unclassified.................. ..	.42	.65	.23	.35	.17	.61	.27	.....	.86	.....
1	6	8	...	21	13	14	4	1	68	Cause not Specified	.91	.33	.91	.45	2.17	1.28	.....	5.55	1.04	.44

TABLE X.—*Causes of Deaths Registered in Rhode Island,*

Class.	CAUSES OF DEATH.[1]	1853.	1854.	1855.	1856.	1857.	1858.	1859.
	ALL CAUSES	1,291	1,806	1,970	2,225	2,510	2,793	2,447
	SPECIFIED CAUSES	1,176	1,655	1,782	1,919	2,222	2,483	2,184
	[CLASSES.]							
I.	ZYMOTIC DISEASES	348	596	457	567	570	716	512
II.	CONSTITUTIONAL DISEASES	349	453	479	447	573	620	598
III.	LOCAL DISEASES	276	329	434	475	563	614	564
IV.	DEVELOPMENTAL DISEASES	140	221	338	369	434	446	421
V.	VIOLENT DEATHS	63	56	74	61	82	87	89
	[ORDERS.]							
I.	1. MIASMATIC DISEASES	331	580	441	548	537	676	472
	2. ENTHETIC DISEASES	2	......	2	3	......	4	12
	3. DIETIC DISEASES	14	11	8	15	29	26	23
	4. PARASITIC DISEASES	1	5	6	1	4	10	5
II.	1. DIATHETIC DISEASES	67	58	68	88	106	112	96
	2. TUBERCULAR DISEASES	282	395	411	359	467	508	502
	DISEASES OF—							
III.	1. NERVOUS SYSTEM	130	161	182	185	221	223	217
	2. ORGANS OF CIRCULATION	29	40	65	43	67	67	64
	3. RESPIRATORY ORGANS	67	73	103	151	164	198	161
	4. DIGESTIVE ORGANS	34	43	57	67	68	93	88
	5. URINARY ORGANS	6	4	13	10	26	17	23
	6. ORGANS OF GENERATION	5	4	3	5	2	7	......
	7. ORGANS OF LOCOMOTION	3	1	2	7	6	6	9
	8. INTEGUMENTARY SYSTEM	2	3	9	7	9	3	2
	9. ORGANS OF SPECIAL SENSE, EYE AND EAR	......	......	......	......	......	......	......
	DEVELOPMENTAL DISEASES OF—							
IV.	1. CHILDREN	54	119	198	221	249	253	247
	2. WOMEN	10	7	9	14	13	24	14
	3. OLD PEOPLE	58	67	84	76	119	114	117
	4. DISEASES OF NUTRITION	18	28	47	58	53	55	45
V.	1. ACCIDENT OR NEGLIGENCE	57	53	57	56	73	73	79
	2. BATTLE	......	......	......	......	......	......	......
	3. HOMICIDE	3	......	9	1	1	1	1
	4. SUICIDE	3	3	8	4	8	13	9
	CAUSES ILL-DEFINED	15	20	19	14	30	14	22
	CAUSES NOT STATED	100	131	169	292	258	296	241

[1] Stillborns included in this table.

for each of the Forty years, 1853 to 1893.

1860.	1861.	1862.	1863.	1864.	1865.	1866.	1867.	1868.	1869.	1870.	1871.	1872.	1873.	1874.
2,853	3,073	2,714	3,318	3,498	3,582	3,142	3,052	3,124	3,602	3,472	3,567	4,449	4,631	4,506
2,628	2,853	2,505	3,081	2,255	3,335	2,938	2,827	2,788	3,251	3,276	3,275	3,986	4,344	4,297
644	771	599	1,068	1,158	1,244	768	595	602	878	793	730	1,117	1,238	1,242
698	729	702	713	687	774	725	748	718	814	834	808	868	879	786
715	788	674	748	816	717	808	837	786	848	885	975	1,167	1,242	1,283
436	457	423	427	478	497	505	525	567	589	627	635	688	829	836
135	108	107	125	116	103	132	122	115	122	137	127	146	156	150
607	724	565	1,019	1,113	1,224	750	569	582	853	761	694	1,083	1,215	1,203
2	5	4	6	5	2	6	6	3	2	6	6	10	4	11
29	34	24	36	31	10	7	11	11	20	20	19	23	14	25
6	8	6	7	9	8	5	9	6	3	6	11	1	5	3
131	126	122	141	123	139	132	123	130	144	167	151	187	198	155
567	603	580	572	564	635	593	625	588	670	667	657	681	681	631
245	287	231	272	294	281	293	316	274	319	339	365	423	450	418
73	108	113	99	124	99	117	115	116	128	120	146	190	193	217
215	224	175	217	236	208	239	214	235	239	235	269	313	322	349
136	101	112	104	114	86	111	120	87	97	116	117	136	154	172
29	27	25	35	28	26	29	43	46	46	48	57	77	85	85
1	9	1	3	1	4	1	1	2	.....	1	.....	5	3	3
5	15	8	9	7	5	5	6	12	11	15	5	11	18	15
11	17	9	9	12	8	13	22	14	8	11	16	12	17	24
......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
255	244	210	205	220	280	261	270	298	293	339	311	350	462	490
13	19	23	21	23	18	24	26	22	27	28	34	36	29	44
116	132	143	161	193	152	178	188	206	217	204	232	233	254	223
52	62	47	40	42	47	42	41	41	52	56	58	69	84	79
119	93	91	104	106	90	119	102	97	105	105	108	126	145	128
......	......	7	3	2	1	1	......	......	......	......	......	......	......	......
4	3	1	5	2	......	1	5	......	2	5	......	2	3	4
12	12	8	13	6	12	11	15	18	15	27	19	18	8	18
37	18	21	20	34	40	33	30	48	51	59	43	87	70	57
188	202	188	217	209	207	171	195	288	300	137	249	376	217	152

TABLE X.—*Causes of Deaths Registered in Rhode Island,*

Class.	CAUSES OF DEATH.[1]	1875.	1876.	1877.	1878.	1879.	1880.	1881.
	ALL CAUSES	4,563	4,340	4,692	4,689	4,688	5,021	5,280
	SPECIFIED CAUSES	4,300	4,095	4,444	4,430	4,386	4,742	4,878
	[CLASSES.]							
I.	ZYMOTIC DISEASES	1,028	990	1,338	1,234	1,158	1,300	1,190
II.	CONSTITUTIONAL DISEASES	940	968	997	986	975	930	1,069
III.	LOCAL DISEASES	1,404	1,303	1,254	1,371	1,465	1,613	1,660
IV	DEVELOPMENTAL DISEASES	757	681	693	680	661	742	777
V.	VIOLENT DEATHS	171	153	162	159	127	157	182
	[ORDERS.]							
I.	1. MIASMATIC DISEASES	992	946	1,296	1,202	1,128	1,269	1,151
	2. ENTHETIC DISEASES	11	12	17	10	12	10	8
	3. DIETIC DISEASES	18	27	17	16	16	21	29
	4. PARASITIC DISEASES	7	5	8	6	2	......	2
II.	1. DIATHETIC DISEASES	193	199	231	185	221	205	239
	2. TUBERCULAR DISEASES	747	769	766	801	754	725	830
	DISEASES OF—							
III.	1. NERVOUS SYSTEM	441	437	463	481	424	551	591
	2. ORGANS OF CIRCULATION	191	168	187	172	208	237	271
	3. RESPIRATORY ORGANS	495	429	322	430	418	508	464
	4. DIGESTIVE ORGANS	159	148	153	165	165	169	187
	5. URINARY ORGANS	85	69	98	92	113	119	110
	6. ORGANS OF GENERATION	1	2	4	1	......	7	3
	7. ORGANS OF LOCOMOTION	16	27	15	10	20	15	11
	8. INTEGUMENTARY SYSTEM	16	23	12	20	17	7	23
	9. ORGANS OF SPECIAL SENSE. EYE AND EAR	......	......	......	......	......	......	......
	DEVELOPMENTAL DISEASES OF—							
IV.	1. CHILDREN	416	332	362	368	326	326	410
	2. WOMEN	35	30	29	26	36	36	38
	3. OLD PEOPLE	216	241	213	222	220	273	247
	4. DISEASES OF NUTRITION	90	78	89	64	79	107	82
V.	1. ACCIDENT OR NEGLIGENCE	142	131	137	135	113	146	155
	2. BATTLE	......	......	......	......	......	......	......
	3. HOMICIDE	3	4	3	3	1	1	4
	4. SUICIDE	26	18	22	21	13	10	23
	CAUSES ILL-DEFINED	56	32	56	49	48	46	55
	CAUSES NOT STATED	207	213	192	210	254	233	347

[1] Stillborns included in this table.

for each of the Forty-one years, 1853 to 1893.

1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	Total and Percentage for 40 years, 1853-1892.	
5,327	5,535	5,413	5,660	6,142	6,616	6,889	6,588	7,230	6,892	7,739	7,852	170,929	100.00
5,011	5,327	5,352	5,544	6,052	6,562	6,815	6,500	7,142	6,823	7,677	7,753	162,140	94.86
1,170	1,077	1,145	1,074	1,311	1,764	1,644	1,374	1,755	1,523	1,842	1,703	41,130	24.06
1,051	1,136	1,119	1,194	1,226	1,084	1,214	1,165	1,281	1,174	1,220	1,193	34,731	20.32
1,756	2,024	1,961	2,205	2,357	2,498	2,663	2,635	2,784	2,801	3,098	3,432	53,396	31.24
819	905	906	870	945	992	1,078	1,083	1,051	1,051	1,185	1,137	26,764	15.66
215	185	221	201	213	224	216	243	271	274	332	288	6,119	3.58
1,119	1,012	1,075	1,008	1,251	1,684	1,563	1,273	1,660	1,428	1,755	1,591	39,359	23.03
17	21	30	19	23	33	40	25	33	24	28	29	474	.28
32	42	38	47	35	46	40	74	61	69	59	82	1,127	.65
2	2	2	......	2	1	1	2	1	2	......	1	170	.10
213	260	253	296	262	264	307	312	299	283	305	325	7,291	4.27
838	876	866	898	964	820	907	853	982	891	915	868	27,440	16.05
602	634	650	642	727	779	805	697	772	747	828	891	17,497	10.24
262	333	293	354	333	411	442	467	413	485	509	535	8,069	4.72
481	577	517	670	696	721	792	805	909	879	1,031	1,164	15,751	9.21
245	236	250	253	319	310	329	356	335	342	364	424	6,698	3.92
118	173	178	215	222	220	244	272	300	300	325	377	4,038	2.36
6	26	14	14	12	14	10	10	8	15	14	20	222	.12
25	26	32	34	26	23	15	18	25	20	17	14	556	.32
17	19	27	23	22	20	26	10	22	13	10	5	565	.33
......	......	......	......	......	......	......	......	......	......	......	2	....	....
408	456	448	453	502	539	596	598	587	626	641	713	14,223	8.33
22	44	39	28	31	29	33	27	26	23	47	50	1,057	.62
283	275	293	267	276	278	290	227	198	185	256	183	7,927	4.64
106	130	126	122	136	146	159	231	240	217	241	191	3,557	2.08
178	157	197	178	194	206	190	216	250	233	309	264	5,853	3.15
......	......	......	......	......	......	......	......	......	......	......	......	14	.01
6	3	2	3	2	2	5	3	2	1	4	3	105	.06
31	25	22	20	17	16	21	24	19	40	19	21	647	.38
45	22	19	57	39	35	46	49	45	35	34	31	1,550	.90
271	186	42	59	51	19	28	39	43	34	28	68	7,230	4.24

Table X.—Continued.

Class.	CAUSES OF DEATH.	1853.	1854.	1855.	1856.	1857.	1858.	1859.
I.	**Order I.**							
	1. Small Pox[1]	14	11	5	9	.....	1	5
	2. Measles	.....	15	3	2	6	75	3
	3. Scarlet Fever	108	46	71	208	147	234	71
	4. Diphtheria	.....	.....	.....	.....	.....	6	20
	5. Cerebro Spinal Meningitis	.....	.....	.....	.....	.....	.....	.....
	6. Quinsy[2]	.....	.....	.....	.....	.....	.....	.....
	7. Croup	27	43	48	62	70	69	58
	8. Whooping Cough	2	14	4	19	9	13	46
	9. Typhoid Fever[3]	25	39	63	53	76	42	70
	10. Erysipelas	3	8	15	12	14	20	15
	11. Metria (Puerperal Fever)	2	2	6	10	8	7	11
	12. Carbuncle	.....	.....	.....	1	.....	1	1
	13. Influenza	2	1	4	.....	15	6	2
	14. Diarrhœa	13	24	51	34	52	42	49
	15. Dysentery	88	118	71	51	65	61	53
	16. Cholera Infantum	39	68	91	77	70	93	61
	17. Cholera[4]	7	191	7	6	3	2	6
	18. Intermittent Fever	.....	.....	.....	1	.....	.....	.....
	19. Remittent Fever[5]	1	.....	2	3	2	4	1
	Order 2.							
	1. Syphilis	1	.....	1	2	.....	3	5
	2. Gonorrhœa	.....	.....	.....	.....	.....	.....	.....
	3. Hydrophobia	1	.....	.....	1	.....	.....	1
	4. Glanders	.....	.....	.....	.....	.....	.....	.....
	5. Malignant Pustule	.....	.....	1	.....	.....	1	6
	6. Septicæmia	.....	.....	.....	.....	.....	.....	.....
	Order 3.							
	1. Inanition	.....	1	.....	1	.....	.....	.....
	2. Puerpera and Scurvy	.....	.....	1	1	4	5	1
	3. Alcoholism, { Delirium Tremens	6	5	4	5	10	13	7
	{ Intemperance	8	5	3	8	15	8	15
	Order 4.							
	1. Thrush	1	4	5	1	3	9	3
	2. Worms	.....	1	1	.....	1	1	2
II.	**Order 1.**							
	1. Gout	.....	.....	.....	.....	.....	.....	.....
	2. Dropsy	45	31	32	50	48	44	41
	3. Anæmia	2	6	4	4	6	12	2
	4. Cancer	13	18	27	26	37	44	43
	5. Noma (Canker)	1	.....	.....	.....	.....	1	.....
	6. Mortification	4	2	3	4	8	7	3
	7. Rheumatism	2	1	2	4	7	4	7
	Order 2.							
	1. Scrofula	6	5	8	7	11	11	8
	2. Tabes Mesenterica	.....	.....	.....	.....	4	6	2
	3. Phthisis (Consumption)	243	349	345	305	400	426	436
	4. Hydrocephalus (Tubercular Meningitis)	33	40	58	47	52	65	56
	5. *Tuberculosis*	.....	1	.....	.....	.....	.....	.....
III.	**Order 1.**							
	1. Cephalitis	28	19	26	19	25	42	20
	2. Apoplexy	22	25	33	39	42	43	51
	3. Paralysis	12	6	20	9	21	21	28
	4. Insanity	4	6	8	14	16	14	16
	5. Chorea	.....	.....	.....	.....	1	.....	2
	6. Epilepsy	4	.....	8	6	8	9	6
	7. Tetanus	.....	3	3	4	6	1	3
	8. Convulsions	29	68	53	64	57	57	50
	9. *Brain Diseases, etc*	31	34	31	30	45	36	41
	10. *Nerve Diseases*	.....	.....	.....	.....	.....	.....	.....
	Order 2.							
	1. Pericarditis	.....	2	1	1	2	.....	1
	2. Aneurism	1	.....	1	1	.....	1	1
	3. *Heart Diseases, etc*	28	38	63	41	65	66	62

[1] Includes 8 cases of Chicken Pox. [2] Includes Mumps. [3] Includes Bilious, Typhus and Continued

Causes of Deaths Registered in Rhode Island.

1860.	1861.	1862.	1863.	1864.	1865.	1866.	1867.	1868.	1869.	1870.	1871.	1872.	1873.	1874.
9	5	7	7	12	22	2	1	2	3	6	12	25	28	8
8	11	12	36	26	16	15	12	20	19	26	6	24	63	7
64	57	47	91	266	255	28	14	93	286	75	66	54	287	462
67	140	81	155	160	82	64	31	20	33	33	57	48	45	59
.....	.....	.....	.....	2	5	1	4	3	1	3	14	23	62	16
3	.....	1	.....	2	1	.....	.....	.....	1	3	.....	.....	1	.....
57	58	76	97	105	94	53	50	30	41	53	72	66	68	65
46	45	15	24	31	56	28	12	26	48	39	25	27	32	45
67	94	84	128	116	233	152	126	86	106	157	130	190	172	121
26	14	11	14	28	21	16	25	25	14	21	18	23	39	26
9	7	4	14	14	13	7	8	12	10	16	18	9	17	16
.....	1	.....	.....	.....	1	2	.....	1	2	1	2	.....	1	.....
2	3	3	6	5	1	1	1	2	.....	.....	.....	1	1	2
41	44	60	62	93	76	49	39	45	50	47	45	100	64	65
49	96	52	262	110	188	148	118	52	74	55	43	83	36	38
151	134	106	114	133	145	110	117	154	151	213	172	391	285	265
7	12	6	9	9	14	72	11	10	11	11	13	18	13	8
.....	.....	.....	.....	1	.....	2	.....	.....	2	.....	.....	.....	.....	.....
1	3	.....	.....	.....	1	.....	.....	1	1	2	1	1	1	.....
2	5	3	2	5	2	5	5	3	.....	5	6	9	3	7
.....	.....	1	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	3	.....	.....	1	.....	.....	2	1	.....	1	1	1
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	4	2	4	4	.....	.....	1	1	2	3	2	.....	.....	2
10	4	5	7	4	3	3	5	4	9	3	7	6	4	3
16	26	17	25	23	7	4	5	6	9	14	10	17	10	19
3	4	4	3	8	5	2	8	4	3	4	11	.....	5	2
3	4	2	4	1	3	3	1	2	.....	2	.....	1	.....	1
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
56	48	46	52	45	61	49	49	49	53	61	56	55	60	39
5	3	4	12	4	3	3	2	4	4	2	6	4	3	2
44	58	61	62	61	55	64	58	60	66	80	66	95	106	87
.....	1	.....	.....	1	.....	2	.....	.....	.....	.....	1	5	1	.....
10	10	7	8	5	12	4	7	6	4	7	9	7	11	5
16	6	4	7	7	8	10	7	11	17	17	13	21	17	22
9	14	14	13	14	12	5	9	3	11	19	22	9	20	20
1	3	3	.....	3	7	2	2	2	10	4	5	5	7	3
505	523	513	512	498	547	526	563	517	555	577	535	600	584	536
52	63	50	47	49	63	56	41	57	76	51	71	44	52	51
.....	.....	.....	.....	.....	6	4	10	9	18	16	24	23	18	21
41	43	36	54	49	39	46	52	40	54	42	44	57	109	60
51	57	43	62	54	55	56	72	57	69	64	77	58	67	70
32	40	36	31	42	45	36	52	54	48	66	79	67	67	86
11	13	7	10	15	20	13	14	13	14	18	16	26	19	13
.....	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....
4	11	6	6	3	7	4	12	5	5	4	10	13	15	16
5	5	6	8	4	6	3	3	3	2	5	5	8	2	8
70	70	55	71	73	73	83	68	63	79	85	83	116	97	98
31	48	42	40	54	36	52	43	38	48	55	51	78	74	67
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	2	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
1	1	2	.....	1	.....	1	1	.....	.....	3	2	1	2	1
69	105	111	99	123	98	116	114	116	128	117	144	189	191	216

Fevers. [4] Includes Cholera Morbus [6] Includes Yellow Fever.

Table X.—Continued.

Class.	CAUSES OF DEATH.	1875.	1876.	1877.	1878.	1879.	1880.	1881.
I.	**Order 1.**							
	1. Small Pox[1]	4	1	5	1	1	.....	3
	2. Measles	2	4	11	81	.....	9	37
	3. Scarlet Fever	185	80	62	86	311	468	138
	4. Diphtheria	33	159	492	435	259	152	216
	5. Cerebro Spinal Meningitis	13	7	8	11	10	20	18
	6. Quinsy[2]	.....	.....	4	3	.....	1	2
	7. Croup	96	102	95	93	96	66	101
	8. Whooping Cough	31	48	32	54	43	20	68
	9. Typhoid Fever[3]	150	123	123	136	101	141	117
	10. Erysipelas	21	18	21	17	25	17	37
	11. Metria (Puerperal Fever)	18	18	17	17	9	15	22
	12. Carbuncle	1	1	3	.....	1	.....	2
	13. Influenza	6	.....	1	.....	4	.....	3
	14. Diarrhœa	70	72	90	53	53	70	77
	15. Dysentery	36	50	52	40	44	28	42
	16. Cholera Infantum	318	250	259	168	161	247	240
	17. Cholera[4]	8	13	20	6	8	11	18
	18. Intermittent Fever	.....	.....	1	.....	.....	.....	1
	19. Remittent Fever[5]	.....	.....	.....	1	2	4	9
	Order 2.							
	1. Syphilis	8	8	10	4	10	10	4
	2. Gonorrhœa	1	2	2	.....	.....	.....	2
	3. Hydrophobia	1	2	2	3	.....	.....	.....
	4. Glanders	.....	.....	1	.....	.....	.....	.....
	5. Malignant Pustule	.....	.....	2	.....	.....	.....	1
	6. Septicæmia	1	.....	.....	3	2	.....	1
	Order 3.							
	1. Inanition	.....	1	.....	.....	.....	.....	2
	2. Puerpera and Scurvy	1	5	5	1	1	6	3
	3. Alcoholism, { Delirium Tremens	4	6	4	3	3	1	10
	3. Alcoholism, { Intemperance	13	15	8	12	12	14	14
	Order 4.							
	1. Thrush	5	4	8	4	1	.....	1
	2. Worms	2	1	.....	2	1	.....	1
II.	**Order 1.**							
	1. Gout	.....	.....	.....	.....	.....	.....	.....
	2. Dropsy	56	66	63	38	50	37	47
	3. Anæmia	4	2	1	2	8	8	4
	4. Cancer	95	106	135	119	125	125	145
	5. Noma (Canker)	2	.....	.....	1	1	2	.....
	6. Mortification (Gangrene)	10	11	8	9	13	9	14
	7. Rheumatism	26	14	24	16	24	24	29
	Order 2.							
	1. Scrofula	21	18	11	13	13	12	15
	2. Tabes Mesenterica	4	5	10	6	3	3	8
	3. Phthisis (Consumption)	657	660	665	685	645	652	712
	4. Hydrocephalus (Tubercular Meningitis)	57	68	55	70	57	46	56
	5. *Tuberculosis*	8	18	25	27	36	12	39
III.	**Order 1.**							
	1. Cephalitis	66	80	81	81	79	88	107
	2. Apoplexy	67	95	109	102	137	119	146
	3. Paralysis	99	70	72	86	83	96	101
	4. Insanity	32	19	12	22	17	19	32
	5. Chorea	.....	.....	1	.....	.....	3	.....
	6. Epilepsy	20	12	19	8	13	14	13
	7. Tetanus	5	2	5	8	6	3	8
	8. Convulsions	100	89	83	112	104	133	102
	9. *Brain Diseases, etc.*	52	70	81	62	85	76	82
	10. *Nerve Diseases*	.....	.....	.....	.....	.....	.....	.....
	Order 2.							
	1. Pericarditis	.....	.....	.....	.....	.....	.....	.....
	2. Aneurism	4	2	4	6	1	2	2
	3. *Heart Diseases, etc.*	187	166	183	166	207	235	269

[1] Includes 8 cases of Chicken Pox. [2] Includes Mumps. [3] Includes Bilious, Typhus and Continued

Causes of Deaths Registered in Rhode Island.

1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	Total and Percentage for 40 years, 1853-1892.	
2	2	......	......	......	......	......	......	1	1	4	......	219	.12
6	14	18	45	18	132	11	29	92	12	28	100	954	.56
45	34	97	91	88	266	207	51	16	33	67	193	5,355	3.13
101	96	119	99	228	287	191	184	211	102	89	157	4,553	2.66
28	26	21	16	10	24	22	9	17	16	18	......	428	.25
......	3	1	1	1	8	4	7	10	6	6	6	69	.04
77	71	80	94	90	113	79	80	83	67	89	60	2,934	1.71
71	9	43	42	49	21	44	77	70	77	25	23	1,430	.84
214	239	128	105	121	116	224	135	107	149	133	129	4,892	2.87
30	28	25	36	31	32	31	28	22	26	25	31	878	.52
28	16	12	19	10	25	18	17	19	12	30	7	542	.31
1	3	4	1	2	3	......	......	2	2	4	3	44	.02
1	......	2	2	7	......	7	4	168	177	336	85	776	.46
90	130	113	84	93	133	80	88	95	84	128	117	2,748	1.61
68	54	40	36	66	66	77	71	87	59	71	42	2,898	1.70
325	242	325	279	377	355	467	427	682	546	633	603	9,341	5.46
24	25	18	24	17	18	30	26	36	28	33	35	809	.48
8	21	20	34	43	83	69	38	41	29	34	6	437	.26
......	......	......	......	......	2	2	2	1	2	2	4	52	.03
16	18	14	7	12	13	11	13	15	8	14	16	269	.15
......	......	......	1	1	1	2	1	......	3	......	1	18	.01
......	......	......	......	......	......	1	2	4	1	......	......	20	.01
......	......	......	......	......	......	......	......	......	......	......	......	1	......
1	......	3	1	......	1	2	1	......	......	1	1	31	.02
......	3	13	10	10	18	24	8	14	12	13	11	135	.08
1	10	7	22	20	28	19	30	31	37	22	30	232	.13
4	3	1	3	3	2	5	7	5	3	1	5	100	.06
7	8	3	5	3	1	2	6	4	27	7	1	231	.13
20	21	27	17	9	15	14	31	21	2	29	46	564	.33
2	2	2	......	2	1	......	2	......	2	......	......	128	.08
......	......	......	......	......	......	1	......	1	......	......	1	42	.02
......	......	1	......	1	1	......	2	......	......	......	1	5	......
50	47	40	44	47	39	47	44	46	35	39	39	1,905	1.12
4	7	7	6	15	16	13	21	19	20	16	23	270	.15
132	169	156	193	159	159	193	189	165	177	181	205	3,954	2.31
......	1	5	......	......	......	......	3	4	1	......	......	33	.02
6	9	10	19	6	15	19	23	20	16	21	17	380	.22
21	27	34	34	34	34	35	30	45	35	48	40	744	.43
14	22	20	18	23	21	12	17	11	21	18	13	550	.32
4	5	15	7	19	6	13	11	11	12	26	8	237	.13
744	766	739	783	827	710	800	727	852	740	759	722	23,718	13.87
49	54	56	47	54	54	50	58	72	66	62	53	2,205	1.30
27	29	36	43	41	29	32	40	36	52	60	72	730	.43
95	91	78	94	104	112	133	109	172	178	167	187	2,860	1.66
154	157	182	185	230	206	211	210	242	219	238	276	4,166	2.43
111	118	116	104	107	122	156	113	99	116	124	131	2,791	1.63
23	29	36	35	49	64	43	22	30	21	27	39	832	.50
......	1	......	......	2	1	2	1	......	1	......	4	16	.01
14	18	11	23	14	17	16	19	23	27	25	12	468	.27
8	8	5	4	8	7	9	7	4	3	6	8	199	.11
110	126	139	111	121	159	154	136	156	137	162	151	3,796	2.21
87	86	83	86	92	91	81	80	46	45	79	75	2,369	1.38
......	......	......	......	......	......	......	......	......	......	......	8	......	......
......	17	......	10	21	29	23	29	27	33	19	17	221	.13
2	8	3	4	2	6	6	7	8	5	3	4	95	.06
250	308	290	344	310	377	413	431	378	447	487	514	7,753	4.54

Fevers. [4] Includes Cholera Morbus. [5] Includes Yellow Fever.

TABLE X.—Continued.

Class.	CAUSES OF DEATH.	1853.	1854.	1855.	1856.	1857.	1858.	1859.
III.	ORDER 3.							
	1. Epistaxis	......	......	......	......	......	......	......
	2. Laryngitis	2	1	1	5	2	5	4
	3. Bronchitis	2	3	4	5	7	13	9
	4. Pleurisy	7	10	12	13	10	12	18
	5. Pneumonia	48	54	79	120	141	166	125
	6. Asthma	1	2	2	3	2	2	2
	7. *Lung Diseases, etc*	7	3	5	5	2	......	3
	ORDER 4.							
	1. Gastritis	......	3	3	8	9	1	4
	2. Enteritis	11	11	13	14	13	23	21
	3. Peritonitis	4	2	13	17	5	10	13
	4. Ascites	......	3	......	......	......	......	......
	5. Ulceration of Intestines	......	......	......	......	......	......	......
	6. Hernia	1	2	2	......	......	5	1
	7. Illeus	2	3	10	10	9	6	6
	8. Intussusception	......	......	......	......	......	......	1
	9. Stricture of Intestines	......	......	1	......	2	......	......
	10. Fistula	......	......	......	......	......	1	......
	11. *Stomach Diseases*	5	5	4	11	7	8	8
	12. *Pancreas Diseases*	......	......	......	......	......	......	......
	13. Hepatitis	......	......	......	......	......	......	6
	14. Jaundice	3	2	2	......	3	4	3
	15. *Liver Diseases, etc*	4	6	6	7	18	31	20
	16. *Spleen Diseases, etc*	......	2	......	......	......	......	......
	17. *Bowel Diseases, etc*	4	4	3	......	2	4	5
	ORDER 5.							
	1. Nephritis (Bright's Disease, etc.)	1	......	......	......	......	......	3
	2. Ischuria	......	......	2	......	2	......	......
	3. Diabetes	1	......	3	3	3	3	3
	4. Calculus (Gravel, etc.)	......	1	......	......	......	2	1
	5. Cystitis	1	1	1	2	......	......	4
	6. Prostate Disease	......	1	......	......	5	2	......
	7. *Kidney Diseases, etc*	1	1	5	5	13	8	12
	8. *Bladder Diseases, etc*	2	......	2	......	3	2	......
	9. Disease of Testicles	......	......	......	......	......	......	......
	ORDER 6.							
	1. Ovarian Dropsy	......	......	2	3	......	4	......
	2. *Uterine Diseases, etc*	5	4	1	2	2	3	......
	ORDER 7.							
	1. Arthritis	......	......	......	......	......	......	......
	2. *Joint Diseases, etc*	3	1	2	7	6	6	9
	ORDER 8.							
	1. Phlegmon	2	......	7	4	3	2	1
	2. Ulcer	......	2	......	1	2	......	......
	3. *Skin Diseases, etc*	......	1	2	2	4	1	1
	ORDER 9.							
	1. Eye and Ear	......	......	......	......	......	......	......
IV.	ORDER 1.							
	1. Stillborn	41	78	124	183	185	177	177
	2. Infantile Debility, Premature Birth, etc	2	13	34	17	17	33	25
	3. Cyanosis	......	1	1	1	......	......	......
	4. Spina Bifida	2	......	......	......	......	2	......
	5. Other Malformations	1	7	11	5	12	12	14
	6. Teething	8	20	28	15	35	29	31
	7. Hemorrhage, Umbilical	......	......	......	......	......	......	......
	ORDER 2.							
	1. Paramenia	......	......	......	......	......	......	......
	2. Childbirth	10	7	9	14	13	24	14

Causes of Deaths Registered in Rhode Island.

1860.	1861.	1862.	1863.	1864.	1865.	1866.	1867.	1868.	1869.	1870.	1871.	1872.	1873.	1874.
......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
8	2	1	1	1	1	1	1	2	4	2	2	2	4	3
18	18	7	17	7	10	17	19	22	20	28	24	26	29	40
20	21	17	14	16	16	20	16	13	19	12	18	12	14	10
162	163	147	174	201	175	193	172	191	190	182	218	229	234	250
3	8	3	8	7	3	4	4	5	3	8	4	4	7	10
4	12	......	3	4	3	4	2	2	3	3	3	40	34	36
11	......	4	8	11	6	2	9	7	9	10	......	16	10	8
23	24	30	27	27	20	30	34	19	25	29	36	15	24	37
14	7	14	5	19	13	13	11	9	6	8	11	24	17	20
......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
2	5	4	7	2	5	1	6	5	4	6	7	2	4	6
16	9	7	5	5	7	9	11	6	8	5	13	3	5	1
1	......	......	......	1	1	1	2	1	1	1	......	1	2	......
1	......	......	1	......	......	......	......	......	......	......	......	......	1	......
......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
9	17	8	12	4	2	4	8	7	2	8	14	13	15	33
......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
9	......	6	......	4	4	7	5	4	6	6	......	2	......	......
7	4	5	2	3	3	6	3	4	3	2	......	2	2	4
31	31	32	34	37	20	37	30	23	28	37	35	31	43	36
......	......	......	1	......	1	......	1	......	2	......	......	......	2	1
12	4	2	2	1	4	1	......	2	3	4	1	27	29	26
1	......	......	......	......	......	8	17	16	18	15	24	37	•39	42
1	......	......	......	......	1	......	......	......	......	......	......	......	......	......
8	8	2	4	6	6	6	1	11	6	8	5	7	8	5
1	......	1	4	2	2	2	3	3	3	1	4	5	2	4
2	......	4	4	......	......	......	......	......	......	......	......	......	......	......
1	1	......	......	......	2	......	......	3	1	2	2	2	4	......
15	15	17	22	16	13	8	15	8	14	16	19	18	27	24
......	3	1	1	4	2	5	7	5	4	6	3	8	5	10
......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
......	2	......	......	......	......	......	......	......	......	......	......	......	......	......
1	7	1	3	1	4	1	1	2	......	1	......	5	3	3
......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
5	15	8	9	7	5	5	6	12	11	15	5	11	18	15
7	11	4	7	9	7	8	15	10	4	9	11	10	10	18
3	......	3	......	1	......	2	3	2	4	2	2	1	5	3
1	6	2	2	2	1	3	4	2	......	......	3	1	2	3
......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
167	146	123	111	138	177	172	163	212	220	234	223	202	228	277
42	45	35	47	46	62	54	60	47	34	57	53	100	169	154
......	......	2	......	......	......	......	......	......	......	......	......	......	......	......
......	3	......	......	......	......	......	......	......	......	......	......	......	......	......
15	10	11	13	8	10	12	17	16	15	14	15	17	15	17
31	40	39	34	28	31	23	30	23	24	34	20	31	50	42
......	......	......	......	......	......	......	......	......	......	......	......	......	......	......
......	......	1	......	2	......	......	......	......	......	......	......	......	......	......
13	19	22	21	21	18	24	26	22	27	28	34	36	29	44

Table X.—Continued.

Class.	CAUSES OF DEATH.	1875.	1876.	1877.	1878.	1879.	1880.	1881.
III.	ORDER 3.							
	1. Epistaxis	......	......	......	......	......	......	......
	2. Laryngitis	4	3	2	2	2	8	6
	3. Bronchitis	58	57	73	80	67	94	86
	4. Pleurisy	10	9	5	8	13	17	9
	5. Pneumonia	400	339	226	317	311	364	327
	6. Asthma	10	7	8	8	13	11	16
	7. *Lung Diseases, etc*	13	14	8	15	12	14	20
	ORDER 4.							
	1. Gastritis	28	13	22	14	17	18	27
	2. Enteritis	29	36	39	40	34	33	44
	3. Peritonitis	28	24	17	22	24	24	27
	4. Ascites	......	......	......	......	......	......	......
	5. Ulceration of Intestines	......	......	......	......	......	......	......
	6. Hernia	1	7	5	7	12	8	10
	7. Illeus	......	8	8	12	9	9	10
	8. Intussusception	......	......	......	3	2	......	5
	9. Stricture of Intestines	1	......	......	......	......	......	......
	10. Fistula	......	......	......	......	......	......	......
	11. *Stomach Diseases*	13	10	7	13	13	10	12
	12. *Pancreas Diseases*	......	......	......	......	......	......	......
	13. Hepatitis	......	5	6	5	5	6	8
	14. Jaundice	4	1	7	4	3	3	3
	15. *Liver Diseases, etc*	43	39	39	40	44	49	35
	16. *Spleen Diseases, etc*	1	......	2	1	......	......	......
	17. *Bowel Diseases, etc*	11	5	1	4	2	9	6
	ORDER 5.							
	*1. Nephritis (Bright's Diseases, etc.)	40	38	46	54	61	66	54
	2. Ischuria	......	......	......	......	......	......	......
	3. Diabetes	11	5	9	4	15	15	16
	4. Calculus (Gravel, etc.)	2	1	9	1	1	......	1
	5. Cystitis	......	......	......	......	......	......	......
	6. Prostate Disease	3	4	2	4	4	4	1
	7. *Kidney Diseases, etc*	25	12	21	27	20	35	25
	8. *Bladder Diseases, etc*	4	9	11	2	12	9	13
	9. Disease of Testicles	......	......	......	......	......	......	......
	ORDER 6.							
	1. Ovarian Dropsy	......	......	......	......	......	......	......
	2. *Uterine Diseases, etc*	1	2	4	1	......	7	3
	ORDER 7.							
	1. Arthritis	......	......	......	......	......	......	......
	2. *Joint Diseases, etc*	16	27	15	10	20	15	11
	ORDER 8.							
	1. Phlegmon	9	18	7	13	14	5	17
	2. Ulcer	3	3	2	2	......	......	3
	3. *Skin Diseases, etc*	4	2	3	5	3	2	3
	ORDER 9.							
	1. Eye and Ear	......	......	......	......	......	......	......
IV.	ORDER 1.							
	1. Stillborn	246	224	242	248	216	192	264
	2. Infantile Debility, Premature Birth, etc	135	75	67	72	69	93	92
	3. Cyanosis	......	......	......	......	......	3	......
	4. Spina Bifida	......	......	......	......	......	......	......
	5. Other Malformations	15	11	28	32	19	13	26
	6. Teething	20	22	27	16	22	25	28
	7. Hemorrhage, Umbilical	......	......	......	......	......	......	......
	ORDER 2.							
	1. Paramenia	......	......	......	......	1	......	......
	2. Childbirth	35	30	29	26	35	36	38

Causes of Deaths Registered in Rhode Island.

1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	Total and Percentage for 40 years, 1853 1892.	
......	......	......	......	......	1	2	......	1	1	......	......	5	......
7	5	11	9	9	8	7	6	5	3	12	7	164	.10
101	111	118	168	174	176	228	260	275	247	308	315	3,026	1.77
8	13	5	7	12	15	18	23	18	26	34	22	570	.33
344	400	363	465	481	488	508	483	569	568	655	776	11,222	6.57
9	14	10	21	15	20	18	16	23	28	12	17	354	.21
12	34	10	......	5	13	11	17	18	6	10	27	410	.24
30	35	27	29	30	34	37	42	38	25	53	47	658	.38
75	47	76	64	85	43	88	78	63	71	73	68	1,524	.88
30	40	40	35	59	66	60	63	63	68	62	74	1,007	.59
......	1	2	......	2	......	1	7	2	3	3	5	24	.01
......	4	1	......	1	5	3	1	......	7	4	......	26	.01
11	7	11	10	15	13	11	10	16	16	22	15	269	.17
8	11	8	17	13	15	22	30	20	18	21	16	395	.23
5	3	5	4	1	......	3	2	2	6	2	11	56	.03
......	1	......	2	1	2	......	1	1	......	3	3	18	.01
......	......	......	......	1	1	1	1	1	......	......	1	6	......
14	16	16	22	29	34	24	33	35	32	14	17	551	.32
......	......	......	......	......	......	......	......	......	......	1	......	1	......
8	7	10	6	9	9	3	7	9	7	15	14	184	.11
8	6	5	9	2	12	12	11	15	19	13	10	204	.12
50	38	40	47	60	65	53	63	56	55	61	72	1,454	.84
......	......	2	......	1	1	1	......	......	......	......	......	19	.01
6	20	7	8	10	10	10	7	14	15	17	71	302	.18
44	93	90	143	140	130	192	176	213	229	220	258	2,240	1.31
......	2	......	......	......	......	......	......	1	2	2	......	13	.01
13	15	25	21	24	22	13	32	27	26	37	40	437	.26
......	1	......	1	......	1	1	5	2	2	......	4	69	.04
......	8	7	12	23	17	10	18	36	15	18	22	183	.11
3	7	4	4	8	7	4	1	2	8	5	3	101	.05
44	36	39	25	24	39	21	34	16	16	38	44	789	.47
14	11	13	9	3	4	3	6	3	2	4	6	205	.12
......	......	......	......	......	......	......	......	......	......	1	......	1	......
......	6	12	8	8	5	5	4	4	8	6	9	77	.04
6	20	2	6	4	9	5	6	4	7	8	11	145	.08
......	......	......	......	......	1	......	1	2	1	2	5	7	......
25	26	32	34	26	22	15	17	23	19	15	9	549	.32
14	18	18	21	13	15	19	7	13	6	5	......	391	.23
2	1	4	......	6	1	......	......	2	4	1	......	70	.04
1	......	5	2	3	4	7	3	7	3	4	5	104	.06
......	......	......	......	......	......	......	......	......	......	......	2	......	......
253	253	272	271	293	276	295	329	296	272	343	412	8,543	4.99
101	137	128	132	157	211	230	195	225	251	245	224	3,761	2.20
......	17	5	6	11	10	16	11	14	23	19	21	140	.08
......	......	......	......	......	......	4	4	6	8	1	5	30	.02
21	19	22	15	15	18	16	15	19	20	15	19	604	.35
33	30	21	29	26	24	35	44	27	52	18	27	1,145	.67
......	......	......	......	......	......	......	......	......	......	......	5	......	......
......	2	4	2	......	1	......	......	......	1	2	......	16	.01
22	42	35	26	31	28	33	27	26	22	45	50	1,041	.61

TABLE X.—Continued.

Class.	CAUSES OF DEATH.	1853.	1854.	1855.	1856.	1857.	1858.	1859.
IV.	ORDER 3.							
	1. Old Age	58	67	84	76	119	114	117
	ORDER 4.							
	1. Atrophy and Debility	18	28	47	58	53	55	43
V.	ORDER 1.							
	(ACCIDENTS OR NEGLIGENCE.)							
	1. Fractures and Contusions	1	1	.....	4	.....	.....	.....
	2. Burns and Scalds	9	9	14	12	7	6	13
	3. Drowning	13	15	18	13	20	24	24
	4. Falls	.....	.....	.....	.....	.....	.....	.....
	5. Poison	1	3	6	4	3	5	4
	6. Suffocation and Strangulation	2	2	.....	7	3	.....	1
	7. Otherwise	31	23	19	16	40	38	37
	ORDER 2.							
	1. Battle	.....	.....	.....	.....	.....	.....	.....
	ORDER 3.							
	1. Homicide	3	.....	9	1	1	1	1
	ORDER 4.							
	1. Suicide	3	3	8	4	8	13	9
	Causes ill-defined	15	20	19	14	30	14	22
	Causes not stated	100	131	169	292	258	296	241

Causes of Deaths Registered in Rhode Island.

1860.	1861.	1862.	1863.	1864.	1865.	1866.	1867.	1868.	1869.	1870.	1871.	1872.	1873.	1874.
116	132	143	161	193	152	178	188	206	217	204	232	223	254	223
52	62	47	40	42	47	42	41	41	52	56	58	69	84	79
......	......	......	......	......	......	12	8	8	6	9	12	15	16	16
24	21	14	10	12	16	18	16	16	15	12	12	12	14	23
32	29	29	21	26	20	27	23	20	24	30	24	29	36	39
......	......	......	......	......	......	17	14	18	21	19	25	18	15	12
7	9	2	1	3	2	6	2	......	4	4	2	1	5	5
1	3	3	1	1	1	......	......	......	......	......	......	......	4	6
55	31	43	71	64	51	39	39	35	35	33	31	51	55	27
......	......	7	3	2	1	1	......	......	......	......	......	......	......	......
4	3	1	5	2	......	1	5	......	2	5	......	2	3	4
12	12	8	13	6	12	11	15	18	15	27	19	18	8	18
37	18	21	20	34	40	33	30	48	51	59	43	87	70	57
188	202	188	217	209	207	171	195	288	300	157	249	376	217	152

Table X.—Continued.

Class.	CAUSES OF DEATH.	1875.	1876.	1877.	1878.	1879.	1880.	1881.
IV.	ORDER 3.							
	1. Old Age	216	241	213	222	220	273	247
	ORDER 4.							
	1. Atrophy and Debility	90	78	89	64	79	107	82
V.	ORDER I. (ACCIDENTS OR NEGLIGENCE.)							
	1. Fractures and Contusions	12	10	13	7	10	18	20
	2. Burns and Scalds	17	12	18	11	13	21	16
	3. Drowning	35	37	30	44	22	33	29
	4. Falls	20	12	14	13	16	14	19
	5. Poison	6	4	9	6	7	5	9
	6. Suffocation and Strangulation	5	9	5	......	......	......	19
	7. Otherwise	47	47	48	54	45	55	43
	ORDER 2.							
	1. Battle	1	......	......	......	......	......	......
	ORDER 3.							
	1. Homicide	3	4	3	3	1	1	4
	ORDER 4.							
	1. Suicide	26	18	22	21	13	10	23
	Causes ill-defined	56	32	56	49	48	46	55
	Causes not stated	207	213	192	210	254	233	347

Causes of Deaths Registered in Rhode Island.

	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	Total and Percentage for 40 years, 1853-1892.	
	283	275	293	267	276	278	290	227	198	185	256	183	7,927	4.64
	106	130	126	122	136	146	159	231	240	217	241	181	3,557	2.08
	16	16	16	15	20	47	33	48	57	59	89	25	614	.36
	17	18	20	19	23	17	27	20	20	18	21	26	633	.37
	40	27	41	42	58	39	46	52	71	52	48	47	1,282	.75
	31	21	31	25	19	17	18	31	32	21	33	25	546	.32
	7	10	8	9	6	7	12	7	11	16	23	14	241	.14
	8	12	11	10	10	14	8	9	12	17	26	14	210	.11
	59	53	70	58	58	65	46	49	47	50	69	173	1,827	1.06
	......	......	......	......	......	......	......	......	......	......	......	......	14	.01
	6	3	2	3	2	2	5	3	2	1	4	3	105	.06
	31	25	22	20	17	16	21	24	19	40	19	21	647	.38
	45	22	19	57	39	35	46	49	45	35	34	31	1,550	.90
	271	186	42	59	51	19	28	39	43	34	28	68	7,239	4.24

Table XI.—OCCUPATIONS AND AGES OF DECEDENTS.

Showing the number and occupations of decedents for the year 1893, and for a period of forty-one years and seven months, 1852 to 1893 inclusive. Ages under Twenty excluded.

OCCUPATIONS.	State of Rhode Island. 1893. Total Mortality.	Aggregate Ages.	Average Age.	41 Years and 7 Months, June 1, 1852, to Dec. 31, 1893. Total Mortality.	Aggregate Ages.	Average Age.
I.						
Tillers of the Soil.						
Farmers	151	10,517	68.53	6,022	401,442	66.66
Florists	3	228	76.00	25	1,271	50.84
Gardeners	14	698	49.86	248	14,540	55.49
Total	168	11,443	68.11	6,295	417,253	66.28
II.						
Professional and Personal.						
Actors	2	75	37.50	12	413	34.42
Architects	2	147	73.50	10	608	60.80
Army Officers	....	......	....	5	255	51.00
Artists	1	55	55.00	29	1,409	48.59
Assayers and Analytical Chemists	....	......	.....	4	239	59.75
Athletes	....	......	.....	1	25	25.00
Authors	....	......	.....	7	477	68.14
Ball Players	2	65	32.50	2	65	32.50
Civil Engineers	1	85	85.00	38	1,908	50.21
Clergymen	10	603	60.30	211	13,356	63.30
Dentists	4	183	45.75	32	1,701	53.16
Designers	1	36	36.00	13	653	50.23
Draughtsmen	....	......	.....	8	271	33.87
Electricians	2	52	26.00	4	101	25.25
Gentlemen	....	......	.....	42	2,792	66.48
Inspectors	....	......	.....	3	136	45.33
Inventors	2	114	57.00	11	689	62.63
Journalists (Editors and Reporters)	4	179	44.75	31	1,409	45.45
Judges and Justices	2	119	59.50	15	981	65.40
Lawyers	2	116	58.00	150	8,265	55.10
Lecturers	..	......	.. ..	1	46	46.00

TABLE XI.—OCCUPATIONS AND AGES.—Continued.

OCCUPATIONS.	State of Rhode Island. 1893. Total Mortality.	1893. Aggregate Ages.	1893. Average Age.	41 Years and 7 Months, June 1, 1852, to Dec. 31, 1893. Total Mortality.	41 Years and 7 Months. Aggregate Ages.	41 Years and 7 Months. Average Age.
Musicians	3	182	60.67	60	2,885	48.08
Naval Officers	....	.....	..	16	765	47.81
Nurses	1	59	59.00	13	681	52.38
Photographers and Lithographers	2	120	60.00	24	1,098	45.75
Physicians	14	848	60.57	274	16,306	59.51
Professors and Teachers	2	93	46.50	125	6,087	48.70
Public Officers	4	315	78.75	73	4,376	59.94
Publishers	3	152	50.67	3	152	50.67
Sheriffs, Constables and Policemen	6	289	48.17	104	5,801	55.78
Sculptors	....	......	....	2	80	40.00
Stenographers	....	......	.....	2	52	26.00
Students	4	105	26.25	68	1,542	22.68
Telephone and Telegraph Operators	1	26	26.00	18	533	29.61
Theatrical Managers	1	33	33.00	1	33	33.00
Veterinary Surgeons	....	......	..	4	198	49.50
Weighers, Gaugers, etc.	....	......	...	5	345	69.00
Total	76	4,051	53.30	1,421	76,733	54.00
III.						
OPTIONAL ACTIVITY.						
Agents and Canvassers	14	734	52.43	193	9,997	51.79
Auctioneers	....	.....	....	6	274	45.67
Bankers and Brokers	4	217	54.25	115	6,801	59.14
Bank Officers	1	37	37.00	62	3,965	63.95
Bar Tenders	4	176	44.00	27	1,031	38.18
Bill-posters	...	.....	...	2	118	59.00
Booksellers	....	......	.....	3	213	71.00
Bottlers	2	70	35.00	5	175	35.00
Butchers and Marketmen	16	840	52.50	245	12,595	51.41
Carriage Dealers	....	......	....	1	55	55.00
Clothiers	....	......	....	11	655	59.55
Coal Dealers	....	......	.....	5	227	45.40
Collectors	....	......	....	16	967	60.44
Contractors and Builders	7	381	54.43	68	3,919	57.63

Table XI.—OCCUPATIONS AND AGES.—Continued.

OCCUPATIONS.	State of Rhode Island. 1893. Total Mortality.	1893. Aggregate Ages.	1893. Average Age.	41 Years and 7 Months, June 1, 1852, to Dec. 31, 1893. Total Mortality.	41 Years and 7 Months. Aggregate Ages.	41 Years and 7 Months. Average Age.
Dealers in Wool Waste	....	......	.....	1	56	56.00
Druggists and Apothecaries	9	272	30.22	78	3,469	44.47
Fish and Oyster Dealers	1	62	62.00	15	903	60.20
Fruiterers	....	......	.....	4	157	39.25
Grain Dealers	....	......	.....	4	239	59.75
Grocers	16	893	55.81	384	20,766	54.08
Hardware Dealers	....	......	.....	2	108	54.00
Hotel Keepers and Innkeepers	6	354	59.00	144	7,965	55.31
Ice-cream Makers	....	......	.....	3	151	50.33
Junk Dealers	1	37	37.00	11	627	57.00
Leather Dealers	....	......	.....	1	35	35.00
Liquor Dealers	3	174	58.00	90	4,014	44.60
Lumber Dealers	....	......	.....	9	440	48.89
Mail Carriers	....	......	.....	11	506	46.00
Policy Brokers	1	24	24.00	1	24	24.00
Manufacturers	24	1,403	58.46	532	32,207	60.54
Merchants	45	2,826	62.80	1,108	65,444	59.06
Opticians	....	......	.....	4	255	63.75
Organ and Piano-tuners	2	148	74.00	5	355	71.00
Pork and Meat-cutters and Pork-packers	....	......	.....	9	369	41.00
Provision Dealers	2	105	52.50	11	648	58.91
Railroad Officials	2	111	55.50	80	3,649	45.62
Real Estate Brokers	1	68	68.00	1	68	68.00
Saloon and Restaurant Keepers	12	562	46.83	169	7,677	45.43
Ship-chandlers	1	76	76.00	5	318	63.60
Shoe Dealers	1	77	77.00	9	492	54.66
Stable Keepers	5	2,910	58.20	70	6,472	92.46
Stock Breeders	1	68	68.00	1	68	68.00
Tobacconists	....	......	.....	10	594	59.40
Traders	2	98	49.00	280	14,071	50.25
Undertakers	4	179	44.75	38	2,204	58.00
Various and Unspecified Tradesmen	5	217	43.40	184	8,863	48.17
Total	192	13,119	68.33	4,033	224,206	55.59

TABLE XI.—OCCUPATIONS AND AGES.—Continued.

OCCUPATIONS.	State of Rhode Island. 1893. Total Mortality.	Aggregate Ages.	Average Age.	41 Years and 7 Months, June 1, 1852, to Dec. 31, 1893. Total Mortality.	Aggregate Ages.	Average Age.
IV.						
OUTDOOR.—*Local.*						
Boat-builders	.....	.....	..	23	1,349	58.65
Brickmakers	1	72	72.00	6	289	48.17
Brick and Stone Layers	1	42	42.00	12	568	47.33
Calkers	1	79	79.00	11	815	74.09
Carpenters and Joiners	68	4,129	60.72	1,755	96,473	54.97
Masons	30	1,588	52.93	734	41,749	56.88
Millwrights	.....	......	.....	31	2,032	65.55
Pavers	.....	......	.....	1	70	70.00
Riggers	.....	......	.....	22	1,254	57.00
Roofers	1	45	45.00	2	126	63.00
Sextons	1	69	69.00	6	3,640	60.67
Ship-carpenters	2	146	73.00	66	4,503	68.23
Slaters	1	38	38.00	7	283	40.43
Stonecutters and Marble-workers	13	739	56.84	224	11,260	50.27
Superintendents of Highways	1	79	79.00	1	79	79.00
Tanners and Curriers	.....	......	.....	43	2,667	62.02
Wheelwrights	3	148	49.33	95	5,700	60.00
Total	123	7,174	58.33	3,039	172,857	56.88
V.						
INDOOR.—*Active.*						
Axe and Scythe Grinders	...	......	.....	4	222	55.50
Bakers	5	2,510	50.20	123	8,913	72.46
Basket Makers	.....	......	.....	5	321	64.20
Bell Hangers	.....	......	....	2	47	23.50
Belt Makers	....	......	.....	8	484	60.50
Blacksmiths and Farriers	28	1,526	54.50	580	31,254	53.89
Bleachers and Fullers	4	165	41.25	57	2,852	50.04
Bobbin Makers	.....	......	.....	1	62	62.00
Boiler Makers	3	177	59.00	64	2,529	39.52
Bolt Makers	....	......	....	3	118	39.33
Bonnet Dressers	....	.....	......	2	73	36.50

TABLE XI.—OCCUPATIONS AND AGES.—Continued.

OCCUPATIONS.	STATE OF RHODE ISLAND. 1893. Total Mortality.	1893. Aggregate Ages.	1893. Average Age.	41 Years and 7 Months, June 1, 1852, to Dec. 31, 1893. Total Mortality.	41 Years and 7 Months, June 1, 1852, to Dec. 31, 1893. Aggregate Ages.	41 Years and 7 Months, June 1, 1852, to Dec. 31, 1893. Average Age.
Brass Finishers.	3	161	53.67	3	161	53.67
Brass and Iron Founders.	....	....	....	9	562	62.44
Brewers.	....	....	....	15	742	49.47
Britannia Workers	....	....	....	1	65	65.00
Broom and Brush Makers	1	64	64.00	14	708	50.57
Cabinet-makers	2	82	41.00	123	7,110	57.80
Calico Printers	1	60	60.00	57	3,106	54.49
Card Makers	....	....	....	4	201	50.25
Carriage-makers and Trimmers	4	239	59.75	65	3,478	53.51
Carvers.	....	....	....	3	147	49.00
Chair Makers.	....	....	....	1	70	70.00
Comb-makers.	....	....	....	5	187	37.40
Confectioners	1	53	53.00	37	1,652	44.65
Cooks and Caterers.	1	62	62.00	65	3,089	47.52
Coopers.	....	....	....	116	7,651	65.96
Coppersmiths.	1	37	37.00	8	494	61.75
Cutters.	....	....	....	5	204	40.80
Distillers.	....	....	....	1	77	77.00
Dyers.	6	291	48.50	110	5,574	50.67
Founders	....	....	....	10	381	38.10
Foundrymen.	....	....	....	5	281	56.20
Furnacemen.	....	....	....	4	195	48.75
Gasfitters.	....	....	....	51	2,162	42.39
Gilders	....	....	....	8	319	39.88
Gold Refiners.	....	....	....	3	153	51.00
Gun and Locksmiths	1	24	24.00	24	1,314	54.75
Hatters.	....	....	....	23	1,225	53.26
Heaters.	1	42	42.00	3	111	37.00
Iron Rollers and Workers	1	54	54.00	9	412	45.78
Janitors.	7	354	50.57	58	2,941	50.71
Japanners.	....	....	....	1	47	47.00
Lathers.	....	....	....	3	95	31.67
Line Makers.	....	....	....	2	117	58.50
Machinists.	70	2,621	37.44	1,286	61,748	48.02
Mechanics.	5	235	47.00	449	23,825	53.06
Melters.	....	....	....	4	245	61.25
Miners.	....	....	....	14	771	55.07
Moulders	22	999	45.41	263	12,102	39.34
Nail Cutters.	....	....	....	11	422	38.35

TABLE XI.—OCCUPATIONS AND AGES.—Continued.

OCCUPATIONS.	STATE OF RHODE ISLAND. 1893. Total Mortality.	Aggregate Ages.	Average Age.	41 Years and 7 Months, June 1, 1852, to Dec. 31, 1893. Total Mortality.	Aggregate Ages.	Average Age.
Oil Refiners	....	......	.....	1	76	76.00
Painters and Glaziers	41	1,993	48.61	723	33,968	46.98
Paper Hangers	4	246	61.50	20	1,058	52.90
Pattern Makers	7	458	65.43	63	3,623	57.51
Pianoforte Makers	....	......	.....	2	90	45.00
Picker Makers	....	......	.....	6	377	62.83
Plane Makers	....	......	.....	1	79	79.00
Plasterers and Stucco-workers	4	192	48.00	42	2,017	48.02
Platers	....	......	.....	3	170	56.67
Plumbers	7	247	35.29	78	3,063	39.27
Porters	....	......	.....	40	1,932	48.30
Pump and Block Makers	....	......	.....	14	788	55.71
Reed Makers	....	......	.....	5	322	64.40
Refiners	....	......	.....	3	84	28.00
Sash and Blind Makers	....	......	.....	10	506	50.60
Scissors Grinders	1	45	45.00	2	115	57.50
Scythe Makers	1	83	83.00	1	83	83.00
Servants	1	20	20.00	22	1,003	45.59
Soap Boilers	1	82	82.00	5	353	70.60
Spindle Makers	....	......	.....	5	297	59.40
Stair Builders	....	......	.....	4	219	54.75
Steam Pipers	3	120	40.00	5	203	40.60
Steel Polishers	....	......	.....	1	42	42.00
Stevedores	....	......	.....	15	712	47.77
Stewards	3	187	62.33	16	693	43.31
Stone Manufacturers	....	......	.....	7	416	59.43
Stove Mounters	....	......	.....	4	185	46.25
Stopper Makers	....	......	.....	1	22	22.00
Sugar Refiners	....	......	.....	7	311	44.43
Superintendents and Overseers	14	835	59.64	234	12,777	54.60
Tallow-chandlers	....	......	.....	4	322	80.50
Tinsmiths	7	307	43.86	100	4,402	44.02
Tool Makers	2	105	52.50	19	1,021	53.74
Trunk Makers	....	......	.....	3	89	29.67
Umbrella Makers	....	......	.....	2	103	51.50
Upholsterers	7	309	44.14	47	1,879	39.98
Waiters	1	46	46.00	104	4,259	40.95
Wire Workers	....	......	.....	8	344	43.00

TABLE XI.—OCCUPATIONS AND AGES.—Continued.

OCCUPATIONS.	State of Rhode Island. 1893. Total Mortality.	1893. Aggregate Ages.	1893. Average Age	41 Years and 7 Months, June 1, 1852, to Dec. 31, 1893. Total Mortality.	41 Years and 7 Months. Aggregate Ages.	41 Years and 7 Months. Average Age.
Wood-Carvers..........	1	52	52.00	3	106	35.33
Wood Finishers.........	1	27	27.00	5	242	48.40
Wood Turners..........	3	132	44.00	37	1,364	36.86
Total.	276	15,242	55.22	5,394	270,734	50.19
VI.						
INDOOR.—*Activity Restricted.*						
Barbers	13	518	39.85	204	7,617	37.34
Bookbinders............	3	200	66.67	24	1,121	46.71
Book-keepers and Accountants............	10	393	39.30	359	15,891	44.26
Box Makers..........	....	......	.....	14	590	42.14
Braid Makers	.....	.....	....	1	66	66.00
Chain Makers	. ..	......	.....	4	193	48.25
Chasers................	1	38	38.00	9	369	41.00
Compositors..	2	81	40.50	2	81	40.50
Cigar Makers	2	103	51.50	94	4,183	44.50
Clerks and Salesmen	62	2,182	35.19	953	35,413	37.16
Clock and Watch Makers	1	59	59.00	30	1,640	54.67
Die Sinkers	1	66	66.00	18	833	46.28
Enamelers.	. ..	......	.....	4	256	64.00
Engravers.............	3	177	59.00	121	5,786	47.82
File-cutters...... ...	3	102	34.00	72	2,930	40.69
File Forgers...........	1	40	40.00	1	40	40.00
Finishers.......... ..	2	82	41.00	8	387	48.38
Harness Makers and Saddlers................	5	337	67.60	100	4,844	48.44
Jewelers..............	40	1,735	43.38	859	34,914	40.64
Lapidaries....	....	.....	....	8	293	36.63
Laundrymen...........	.....	......	.....	9	373	41.44
Leather-dressers.......	.....	......	.....	2	141	70.50
Lighthouse Keepers. ..	1	89	89.00	5	300	60.00
Millers	.	.....	. ..	42	2,465	58.69
Operatives.............	92	4,183	45.47	2,038	88,858	43.60
Paper-makers	....	.....	.....	5	327	65.40
Pearl Cutters...........	1	57	57.00	2	85	42.50

TABLE XI.—OCCUPATIONS AND AGES.—Continued.

OCCUPATIONS.	State of Rhode Island. 1893. Total Mortality.	1893. Aggregate Ages.	1893. Average Age.	41 Years and 7 Months, June 1, 1852, to Dec. 31, 1893. Total Mortality.	41 Years and 7 Months. Aggregate Ages.	41 Years and 7 Months. Average Age.
Polishers	1	38	38.00	17	800	47.06
Printers	4	199	66.33	168	973	57.92
Roll Coverers	....	......	.....	27	1,631	60.40
Rope-makers	....	......	....	25	1,672	66.88
Rubber Workers	5	234	46.80	127	5,196	40.91
Sail-makers	....	......	.....	32	1,886	58.94
Shoemakers	16	681	42.56	537	30,916	55.71
Silversmiths	3	139	46.33	100	4,464	44.64
Tailors	14	972	69.43	371	20,297	54.71
Watchmen	15	816	54.40	137	7,547	55.09
Wool Sorters	4	270	67.50	42	1,994	47.48
Cop Tube Makers	1	64	64.00	1	64	64.00
Total	305	13,855	45.43	6,572	287,436	43.74
VII.						
Occupations at Large.						
Baggage Masters	....	......	.....	3	88	29.33
Boatmen	....	......	....	24	1,377	57.29
Brakemen	6	219	36.50	85	2,443	28.74
Car Drivers and Conductors	3	121	40.33	23	844	36.70
Coachmen	9	383	42.56	166	7,197	43.35
Drivers	5	173	34.60	20	790	39.50
Cab and Hack	2	82	41.00	36	1,562	43.39
Drovers	....	......	.....	2	83	41.50
Engineers and Firemen	22	1,355	61.59	309	14,756	47.75
Expressmen	6	319	53.17	78	3,905	50.06
Fire Company Members	2	63	31.50	3	94	31.33
Fishermen and Oystermen	5	241	48.20	203	10,007	49.30
Gripmen	....	......	. .	1	27	27.00
House Movers	....	......	.....	5	345	69.00
Horse-Jockeys	1	47	47.00	1	47	47.00
Hostlers	7	277	39.57	101	4,238	41.96
Icemen	....	......	. ...	4	265	66.25
Laborers	388	19,371	49.93	8,475	417,792	49.30
Lamplighters	3	139	46.33	15	795	53.00
Linemen	. ..	......	. ...	2	83	41.50

Table XI.—OCCUPATIONS AND AGES.—Continued.

Occupations.	State of Rhode Island. 1893. Total Mortality.	Aggregate Ages.	Average Age.	41 Years and 7 Months, June 1, 1852, to Dec. 31, 1893. Total Mortality.	Aggregate Ages.	Average Age.
Lumbermen	..	......	.....	1	87	87.00
Mariners.	2	74	37.00	513	25,300	49.32
Messengers	....	......	.....	1	29	29.00
Milkmen.	1	43	43.00	9	361	40.11
Motormen	1	32	32.00	1	32	32.00
Pilots	2	103	51.50	18	994	55.22
Peddlers	9	444	49.33	147	7,381	50.21
Sailors	9	381	42.33	232	11,304	48.72
Sea Captains or Ship-masters	7	535	76.43	147	9,866	67.12
Soldiers	1	55	55.00	139	4,252	30.59
Stage Drivers	1	71	71.00	8	398	49.75
Switchmen	4	245	61.25	10	598	59.80
Teamsters	25	1,235	49.40	479	22,660	47.30
Total	521	26,008	49.92	11,261	550,000	48.84
VIII.						
Employments of Women.						
Actresses	....	......	.....	2	48	24.00
Agents	....	......	....	1	59	59.00
Artists	....	......	....	2	137	68.50
Basket Makers	...	.....	.....	2	149	74.50
Boardinghouse Keepers	1	37	37.00	22	1,377	62.59
Bookbinders	....	.....	.....	1	43	43.00
Book-keepers	....	......	.. ..	4	131	32.75
Box Makers.	....	......	....	5	150	30.00
Brush Makers	1	26	26.00	1	26	26.00
Cap Makers	....	.....	.....	1	28	28.00
Chain Makers	....	......	.....	3	91	30.33
Cigar Makers	....	......	. ..	5	140	28.00
Clerks and Saleswomen	2	67	33.50	20	579	28.95
Cooks	3	162	54.00	33	1,766	53.52
Dressmakers and Seamstresses	11	472	42.90	297	12,512	42.13
Farming.	....	......	.....	2	148	74.00
Hairdressers	....	......	....	1	25	25.00
Harness Makers	....	......	.....	1	52	52.00

TABLE XI.—OCCUPATIONS AND AGES.—Continued.

OCCUPATIONS.	State of Rhode Island.					
	1893.			41 Years and 7 Months, June 1, 1852, to Dec. 31, 1893.		
	Total Mortality.	Aggregate Ages.	Average Age.	Total Mortality.	Aggregate Ages.	Average Age.
Housekeepers	127	7,204	56.72	2,340	129,964	55.54
Housewives	14	786	56.14	165	8,562	51.89
Jewelers	.....	.....	.....	14	376	26.86
Laboring	.....	.....	.....	16	699	43.69
Laundresses	1	38	38.00	28	1,382	49.36
Midwives	.....	.....	.....	2	128	64.00
Milliners	3	150	50.00	53	1,899	35.83
Musicians	1	26	26.00	3	99	33.00
Nurses	4	284	71.00	92	5,729	62.27
Operatives	41	1,262	30.78	836	26,009	31.11
Physicians	.....	.....	.....	9	497	55.22
Public Officers	.....	.....	.....	2	110	55.00
Rubber Workers	.....	.....	.....	13	406	31.33
Servants and Domestics	12	533	44.42	438	21,146	48.28
Shopkeepers	.....	.....	.....	8	414	51.75
Sisters of Mercy	1	24	24.00	27	1,012	37.48
Stewardesses	.....	.....	.....	1	38	38.00
Superintendents	.....	.....	.....	2	126	63.00
Tailoresses	4	165	41.25	140	6,437	45.98
Teachers	6	2,440	40.67	200	10,557	52.79
Telegraph and Telephone Operators	.....	.....	.....	1	54	54.00
Upholsterers	.....	.....	.....	1	34	34.00
Waitresses	.....	.....	.....	7	215	30.71
Total	232	13,676	58.95	4,801	233,354	48.61

Table XI.—OCCUPATIONS.—Recapitulation.

Occupations.	State of Rhode Island. 1893. Total Mortality.	1893. Aggregate Ages.	1893. Average Age.	41 Years and 7 Months, June 1, 1852, to Dec. 31, 1893. Total Mortality.	41 Years and 7 Months. Aggregate Ages.	41 Years and 7 Months. Average Age.
I. Tillers of the Soil. . . .	168	11,443	68.11	6,295	417,253	66.28
II. Professional and Personal.	76	4,051	53.30	1,421	76,733	54.00
III. Optional Activity	192	13,119	68.33	4,033	224,206	55.59
IV. Outdoor.—*Local*.	123	7,174	58.33	3,039	172,857	56.88
V. Indoor.—*Active*.	276	15,242	55.22	5,394	270,734	50.19
VI. Indoor. — *Activity Restricted*.	305	13,855	45.43	6,572	287,486	43.74
VII. Occupations at Large. .	521	26,008	49.92	11,261	550,000	48.84
VIII. Employments of Women	232	13,676	57.95	4,801	233,354	48.61
All Classes.	1,893	104,568	55.23	42,816	2,232,573	52.14

TABLE XII.—OCCUPATIONS AND CAUSES OF DEATH, 1893.

Ages under twenty excluded.

OCCUPATIONS.	Whole Number.	Accidents.	Alcoholism.	Apoplexy and Paralysis.	Asthma.	Bladder, Diseases of.	Bowel Diseases.	Brain, Diseases of.	Bronchitis.	Cancer.	Consumption.	Debility.	Diabetes.	Diarrhœa and Dysentery.	Dropsy.	Enteritis.	Epilepsy.	Erysipelas.	Fevers, Malarial.	Fevers, Typhoid, etc.	Heart Diseases.	Influenza.	Insanity.	Kidney Diseases.	Liver Diseases.	Old Age.	Peritonitis.	Pleurisy.	Pneumonia.	Rheumatism.	Septicæmia.	Stomach Diseases.	Suicide.	Tuberculosis.
I.																																		
TILLERS OF THE SOIL.																																		
Farmers	149	3	4	11	1	3	3	4	2	10	11	3	5	3	2	1	..	..	..	1	23	4	1	8	2	18	1	..	16	..	..	2	3	..
Florists	3	..	..	1	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..
Gardeners	14	1	..	1	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	3	1	..	1	..	..	..	..	5	..	..	..	..	..
Total	166	4	4	16	1	3	3	4	2	10	13	4	5	3	2	1	..	1	..	1	26	5	1	10	2	18	1	..	21	..	..	2	3	..
II.																																		
PROFESSIONAL AND PERSONAL.																																		
Actors	2	..	..	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Architects	2	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..
Artists	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Ball Players	2	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

TABLE XII.—OCCUPATIONS AND CAUSES OF DEATH, 1893.—Continued.

OCCUPATIONS.	Whole Number.	Accidents.	Alcoholism.	Apoplexy and Paralysis.	Asthma.	Bladder, Diseases of.	Bowel Diseases.	Brain, Diseases of.	Bronchitis.	Cancer.	Consumption.	Debility.	Diabetes.	Diarrhœa and Dysentery.	Dropsy.	Enteritis.	Epilepsy.	Erysipelas.	Fevers, Malarial.	Fevers, Typhoid, etc.	Heart Diseases.	Influenza.	Insanity.	Kidney Diseases.	Liver Diseases.	Old Age.	Peritonitis.	Pleurisy.	Pneumonia.	Rheumatism.	Septicæmia.	Stomach Diseases.	Suicide.	Tuberculosis.
Civil Engineers	1																				1													
Clergymen	9								1			1									2					1			2	1		1		
Dentists	4	1		1							1													1										
Designers	1																			1														
Electricians	2			1																									1					
Inventors	2										1										1													
Journalists (Editors and Reporters)	4		1			1					1										1													
Judges and Justices	2		1			1																												
Lawyers	2				1																								1					
Musicians	3			1						1	1																							
Nurses	1																							1										
Photographers and Lithographers	2									1											1													
Physicians	13	1	1	1		1				2											2			1			1		3					
Professors and Teachers	2																				1								1					
Public Officers	4									1															2					1				
Publishers	3								1												2													
Sheriffs, Constables and Policemen	6				1		1			1										1	1								1					

OCCUPATIONS.	Whole Number.	Accidents.	Alcoholism.	Apoplexy and Paralysis.	Asthma.	Bladder, Diseases of.	Bowel Diseases.	Brain, Diseases of.	Bronchitis.	Cancer.	Consumption.	Debility.	Diabetes.	Diarrhœa and Dysentery.	Dropsy.	Enteritis.	Epilepsy.	Erysipelas.	Fevers, Malarial.	Fevers, Typhoid, etc.	Heart Diseases.	Influenza.	Insanity.	Kidney Diseases.	Liver Diseases.	Old Age.	Peritonitis.	Pleurisy.	Pneumonia.	Rheumatism.	Septicæmia.	Stomach Diseases.	Suicide.	Tuberculosis.
Students.	2										1									1														
Telephone and Telegraph Operators.	1										1																							
Theatrical Managers	1										1																							
Total.	72	2	3	6	2	3	1	1	2	6	10	1								3	12			3	2	1	1		9	2		2		
III. Optional Activity.																																		
Agents and Canvassers	14	2		1				1	4		1		1					1			2								1					
Bankers and Brokers	4																				3				1									
Bar Tenders.	4										1				1									2										
Bottlers	2	1		1																														
Butchers and Marketmen.	15	1		1				1	2		2										2	1		1	1		1		1				1	
Contractors and Builders.	7																			1	1		1	2					2					
Druggists & Apothecaries	9	1		1							1									1	2			1					2					
Fish and Oyster Dealers	1																				1													
Grocers.	16			3						1		1	1								4			3	1		2						1	
Hotel Keepers and Inn-keepers.	5			1																	2			1	1									
Junk Dealers.	1								1																									

TABLE XII.—OCCUPATIONS AND CAUSES OF DEATH, 1893.—Continued.

OCCUPATIONS.	Whole Number.	Accidents.	Alcoholism.	Apoplexy and Paralysis.	Asthma.	Bladder, Diseases of.	Bowel Diseases.	Brain, Diseases of.	Bronchitis.	Cancer.	Consumption.	Debility.	Diabetes.	Diarrhoea and Dysentery.	Dropsy.	Enteritis.	Epilepsy.	Erysipelas.	Fevers, Malarial.	Fevers, Typhoid, etc	Heart Diseases.	Influenza.	Insanity.	Kidney Diseases.	Liver Diseases.	Old Age.	Peritonitis.	Pleurisy.	Pneumonia.	Rheumatism.	Septicæmia.	Stomach Diseases.	Suicide.	Tuberculosis.
Liquor Dealers	3								1																				2					
Policy Brokers	1	1																																
Manufacturers	24	1		2		1			1	1	1		1							1	2			5		3			4			1		
Merchants	44			9				2		3	6	4						1		1	2	1	1	4	2	1			6	1				
Organ and Piano-tuners	2																				1			1										
Provision Dealers	1																				1													
Railroad Officials	2																			1									1					
Real Estate Brokers	1																								1									
Saloon and Restaurant Keepers	12	2		2				1			1		1			1		1			1						1		1					
Ship-chandlers	1							1																										
Shoe Dealers	1																				1													
Stable Keepers	4		1	1							2																							
Stock Breeders	1																								1									
Traders	1						1																											
Undertakers	4							2																		1						1		
Various and Unspecified Tradesmen	5			1																	1			2					1					
Total	185	9	1	23	..	1	1	8	9	5	15	5	4	..	1	1	..	3	..	5	26	2	2	22	8	5	3	..	21	1	..	2	2	..

OCCUPATIONS.	Whole Number.	Accidents.	Alcoholism.	Apoplexy and Paralysis.	Asthma.	Bladder, Diseases of.	Bowel Diseases.	Brain, Diseases of.	Bronchitis.	Cancer.	Consumption.	Debility.	Diabetes.	Diarrhœa and Dysentery.	Dropsy.	Enteritis.	Epilepsy.	Erysipelas.	Fevers, Malarial.	Fevers, Typhoid, etc.	Heart Diseases.	Influenza.	Insanity.	Kidney Diseases.	Liver Diseases.	Old Age.	Peritonitis.	Pleurisy.	Pneumonia.	Rheumatism.	Septicæmia.	Stomach Diseases.	Suicide.	Tuberculosis.
IV.																																		
OUTDOOR.—*Local.*																																		
Brickmakers	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Brick and Stone Layers	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Calkers	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Carpenters and Joiners	68	4	1	6	..	1	..	2	4	3	9	1	..	..	..	..	..	..	..	3	7	..	..	4	3	3	..	..	16	..	..	..	1	..
Masons	28	..	..	3	1	..	..	..	2	4	1	1	1	..	..	..	..	..	..	..	3	..	..	3	2	1	..	..	6	..	..	..	..	..
Roofers	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Sextons	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Ship-carpenters	2	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
Slaters	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Stonecutters and Marble-workers	13	1	..	1	..	..	..	1	1	3	..	..	..	..	..	..	..	..	..	1	..	1	..	..	..	1	1	..	2	..	..	..	..	..
Superintendents of Highways	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Wheelwrights	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	2
Total	121	7	1	14	1	1	..	3	7	11	11	2	1	..	..	..	..	..	..	4	10	1	..	7	5	6	1	1	24	..	..	..	1	2

TABLE XII.—OCCUPATIONS AND CAUSES OF DEATH, 1893.—Continued.

OCCUPATIONS.	Whole Number.	Accidents.	Alcoholism.	Apoplexy and Paralysis.	Asthma.	Bladder, Diseases of.	Bowel Diseases.	Brain, Diseases of	Bronchitis.	Cancer.	Consumption.	Debility.	Diabetes.	Diarrhœa and Dysentery.	Dropsy.	Enteritis.	Epilepsy.	Erysipelas.	Fevers, Malarial.	Fevers, Typhoid, etc.	Heart Diseases.	Influenza.	Insanity.	Kidney Diseases.	Liver Diseases.	Old Age.	Peritonitis.	Pleurisy.	Pneumonia.	Rheumatism.	Septicæmia.	Stomach Diseases.	Suicide.	Tuberculosis.
V.																																		
INDOOR.—*Active.*																																		
Bakers	5	1	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	..	..	..	1	..	..	1	..	..	..	..	..
Blacksmiths and Farriers	26	..	..	2	..	..	..	..	..	1	7	1	..	..	..	..	..	..	1	1	5	..	..	2	..	1	1	..	2	..	..	..	..	2
Bleachers and Fullers	4	..	..	..	..	..	..	..	..	..	1	..	..	..	1	1	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
Boiler Makers	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	1	..	..	..	..	..
Brass Finishers	3	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	..	..	..	..
Broom and Brush Makers	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
Cabinet-makers	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..
Calico Printers	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Carriage-makers and Trimmers	4	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	..	..	..	..	..
Confectioners	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..
Cooks and Caterers	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..
Coppersmiths	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Dyers	6	2	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..
Gun and Locksmiths	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Heaters	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Iron Rollers and Workers	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..

OCCUPATIONS.	Whole Number.	Accidents.	Alcoholism.	Apoplexy and Paralysis.	Asthma.	Bladder, Diseases of.	Bowel Diseases.	Brain, Diseases of.	Bronchitis.	Cancer.	Consumption.	Debility.	Diabetes.	Diarrhœa and Dysentery.	Dropsy.	Enteritis.	Epilepsy.	Erysipelas.	Fevers, Malarial.	Fevers, Typhoid, etc.	Heart Diseases.	Influenza.	Insanity.	Kidney Diseases.	Liver Diseases.	Old Age.	Peritonitis.	Pleurisy.	Pneumonia.	Rheumatism.	Septicæmia.	Stomach Diseases.	Suicide.	Tuberculosis.
Janitors	6	..	..	..	..	..	..	1	..	..	..	..	..	1	..	..	..	..	..	..	1	..	..	..	..	..	1	..	1	..	..	..	..	1
Machinists	69	2	2	11	1	1	..	4	4	..	7	..	1	..	..	..	..	..	1	1	6	1	1	4	1	1	3	..	12	..	..	1	3	1
Mechanics	4	..	..	1	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
Moulders	21	..	1	..	..	..	..	1	1	..	4	..	..	..	..	..	..	..	..	..	2	..	..	5	1	..	..	1	5	..	..	..	..	..
Painters and Glaziers	39	3	..	5	..	1	..	2	1	..	6	..	1	..	..	..	..	1	..	2	6	..	1	..	2	1	..	..	2	..	3	..	1	1
Paper Hangers	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	1	..	..	1	..	..	..	..	..
Pattern Makers	7	..	..	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	..	1	..	..	..	..	..	..	..	..	..	..
Plasterers and Stucco-workers	4	..	1	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	..	..	..	..
Plumbers	7	1	..	2	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	1	..	..	..	..	..
Servants	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Scissors Grinders	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Scythe Makers	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
Soap Boilers	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
Steam Pipers	3	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..
Stewards	3	..	..	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..
Superintendents and Overseers	14	..	..	1	..	..	..	..	..	..	1	..	..	1	..	..	..	..	..	..	2	..	..	6	..	..	..	..	3	..	..	..	..	..
Tinsmiths	7	1	..	1	..	1	..	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..
Tool Makers	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	1	..
Upholsterers	7	..	..	..	..	..	..	..	..	..	3	..	..	..	..	..	..	..	..	..	1	..	..	3	..	..	..	..	..	..	..	..	..	..

TABLE XII.—OCCUPATIONS AND CAUSES OF DEATH, 1893.—Continued.

OCCUPATIONS.	Whole Number.	Accidents.	Alcoholism.	Apoplexy and Paralysis.	Asthma.	Bladder, Diseases of.	Bowel Diseases.	Brain, Diseases of.	Bronchitis.	Cancer.	Consumption.	Debility.	Diabetes.	Diarrhœa and Dysentery.	Dropsy.	Enteritis.	Epilepsy.	Erysipelas.	Fevers, Malarial.	Fevers, Typhoid, etc.	Heart Diseases.	Influenza.	Insanity.	Kidney Diseases.	Liver Diseases.	Old Age.	Peritonitis.	Pleurisy.	Pneumonia.	Rheumatism.	Septicæmia.	Stomach Diseases.	Suicide.	Tuberculosis.
Waiters	1																												1					
Wood-Carvers	1																												1					
Wood Finishers	1										1																							
Wood Turners	3										1										2													
Total	268	16	4	30	1	3	1	9	7	1	40	1	3	2	1	1	..	1	2	6	36	2	2	28	6	6	6	2	35	1	3	1	7	4
VI.																																		
INDOOR.—*Activity Restricted.*																																		
Barbers	13		1							1	5										3			1					2					
Bookbinders	3			1																									2					
Book-keepers and Accountants	10										4									1				1				1	2	1				
Chasers	1										1																							
Compositors	2			1							1																							
Cigar Makers	2										1										1													
Clerks and Salesmen	61	1	1	4				3		1	18			1						1	4		1	5	3		1	1	11	1	1			3
Clock and Watch Makers	1																															1		

OCCUPATIONS.	Whole Number.	Accidents.	Alcoholism.	Apoplexy and Paralysis.	Asthma.	Bladder, Diseases of.	Bowel Diseases.	Brain, Diseases of.	Bronchitis.	Cancer.	Consumption.	Debility.	Diabetes.	Diarrhœa and Dysentery.	Dropsy.	Enteritis.	Epilepsy.	Erysipelas.	Fevers, Malarial.	Fevers, Typhoid, etc.	Heart Diseases.	Influenza.	Insanity.	Kidney Diseases.	Liver Diseases.	Old Age.	Peritonitis.	Pleurisy.	Pneumonia.	Rheumatism.	Septicæmia.	Stomach Diseases.	Suicide.	Tuberculosis.
Die Sinkers	1	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Engravers	3	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	..
File-cutters	3	..	..	..	..	..	..	..	1	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
File Forgers	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Finishers	2	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
HarnessMakers&Saddlers	5	1	..	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	1	..	..	..	..	..
Jewelers	40	3	..	5	..	2	..	..	..	..	11	..	1	1	..	..	..	..	..	1	2	..	..	3	1	..	1	..	4	..	..	1	2	2
Lighthouse Keepers	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
Operatives	92	11	2	3	..	..	1	4	3	..	25	..	1	..	..	..	..	..	..	1	7	1	..	3	1	6	..	1	18	..	1	2	..	1
Pearl Cutters	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..
Polishers	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Printers	3	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
Rubber Workers	5	..	..	..	..	1	..	..	..	..	2	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	1	..	1
Shoemakers	15	1	..	2	..	1	..	..	..	1	6	..	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	2	..	..	..	..	..
Silversmiths	3	..	..	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
Tailors	14	..	..	3	..	..	..	1	1	..	1	..	..	..	..	..	..	..	..	..	2	..	..	1	..	..	..	..	5	..	..	..	..	..
Watchmen	14	1	..	3	..	..	..	1	..	..	2	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	4	..	..	..	..	..
Wool Sorters	4	..	..	..	..	1	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..
Cop Tube Makers	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..
Total	302	18	4	26	..	5	1	10	8	3	85	..	2	3	..	..	..	..	..	4	23	1	1	18	5	7	2	3	53	2	2	7	2	7

TABLE XII.—OCCUPATIONS AND CAUSES OF DEATH, 1893.—Continued.

OCCUPATIONS.	Whole Number.	Accidents.	Alcoholism.	Apoplexy and Paralysis.	Asthma.	Bladder, Diseases of.	Bowel Diseases.	Brain, Diseases of.	Bronchitis.	Cancer.	Consumption.	Debility.	Diabetes.	Diarrhœa and Dysentery.	Dropsy.	Enteritis.	Epilepsy.	Erysipelas.	Fevers, Malarial.	Fevers, Typhoid, etc.	Heart Diseases.	Influenza.	Insanity.	Kidney Diseases.	Liver Diseases.	Old Age.	Peritonitis.	Pleurisy.	Pneumonia.	Rheumatism.	Septicæmia.	Stomach Diseases.	Suicide.	Tuberculosis.
VII.																																		
OCCUPATIONS AT LARGE.																																		
Brakemen	6	4									2																							
Car Drivers and Conductors	3									1										1		1												
Coachmen	9	1								1	3													1	1					1		1		
Drivers	5										1									1							1		2					
Cab and Hack	2																												2					
Engineers and Firemen	22	2		4				2	1	1			1								1			5	2				3					
Expressmen	6		1				1												1	1				1					1					
Fire Company Members	2	1																		1														
Fishermen and Oystermen	5	1									2										1					1								
Horse-Jockeys	1																								1									
Hostlers	7										2						1				2								2					
Laborers	379	33	7	21	1	2	6	9	24	9	58	6	1	7	4	1		1		18	31	4		26	7	14	6	6	63	2	1	6	2	3
Lamplighters	3	1									1																		1					
Mariners	2										1													1										
Milkmen	1																												1					

OCCUPATIONS.	Whole Number.	Accidents.	Alcoholism.	Apoplexy and Paralysis.	Asthma.	Bladder, Diseases of.	Bowel Diseases.	Brain, Diseases of.	Bronchitis.	Cancer.	Consumption.	Debility.	Diabetes.	Diarrhœa and Dysentery.	Dropsy.	Enteritis.	Epilepsy.	Erysipelas.	Fevers, Malarial.	Fevers, Typhoid, etc.	Heart Diseases.	Influenza.	Insanity.	Kidney Diseases.	Liver Diseases.	Old Age.	Peritonitis.	Pleurisy.	Pneumonia.	Rheumatism.	Septicæmia.	Stomach Diseases.	Suicide.	Tuberculosis.
Pilots	2		1								1																							
Peddlers	9	1	1							1	2										2				1				1					
Sailors	9	1	1	3					1		1											1					1							
Sea Captains or Ship-masters	7			1				2													1				2				1					
Soldiers	1																				1													
Stage Drivers	1			1																														
Switchmen	4			1					1	1																			1					
Teamsters	25	3	1							2	2	1									4	1		3	2	1			5					
Total	511	48	12	31	1	2	7	13	27	16	76	7	2	7	4	1	1	1	1	22	43	7	..	37	16	16	8	6	83	3	1	7	2	3
VIII.																																		
EMPLOYMENTS OF WOMEN.																																		
Brush Makers	1										1																							
Clerks and Saleswomen	2																							1					1					
Cooks	3	1																				1										1		
Dressmakers and Seamstresses	11	1		1							4			1										1			1		1			1		

TABLE XII.—OCCUPATIONS AND CAUSES OF DEATH, 1893.—Continued.

OCCUPATIONS.	Whole Number.	Accidents.	Alcoholism.	Apoplexy and Paralysis.	Asthma.	Bladder, Diseases of.	Bowel Diseases.	Brain, Diseases of.	Bronchitis.	Cancer.	Consumption.	Debility.	Diabetes.	Diarrhœa and Dysentery.	Dropsy.	Enteritis.	Epilepsy.	Erysipelas.	Fevers, Malarial.	Fevers, Typhoid, etc.	Heart Diseases.	Influenza.	Insanity.	Kidney Diseases.	Liver Diseases.	Old Age.	Peritonitis.	Pleurisy.	Pneumonia.	Rheumatism.	Septicæmia.	Stomach Diseases.	Suicide.	Tuberculosis.
Housekeepers	126	1	..	11	2	1	1	1	11	9	12	1	5	1	3	..	..	1	1	..	18	2	..	5	3	7	3	..	22	1	..	3	..	1
Housewives	14	1	1	1	..	..	..	..	1	1	2	..	..	..	..	1	..	..	..	..	1	..	..	2	1	1	..	..	1	..	..	..	..	..
Laundresses.	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Milliners.	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	1	..	1	..	..	..	..	..	..	..	..	..	..
Musicians.	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
Nurses	4	..	..	..	..	..	..	..	..	1	..	1	..	..	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..
Operatives	41	4	1	..	..	..	..	..	3	..	14	3	..	..	1	..	..	..	1	1	1	..	1	1	..	..	4	..	4	1	..	..	..	1
Servants and Domestics	12	..	..	1	..	..	..	1	2	..	1	..	..	..	..	..	..	..	..	2	1	1	..	1	..	2	..	..	..	..	..	..	..	..
Sisters of Mercy	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Tailoresses	4	..	..	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..
Teachers	6	..	..	..	..	..	..	..	1	1	3	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	230	8	2	15	2	1	1	2	18	12	40	5	5	2	4	1	..	1	3	3	25	5	1	14	4	10	8	..	29	2	..	5	..	2

TABLE XII.—Continued.—OCCUPATIONS AND CAUSES OF DEATH, 1893.—RECAPITULATION.

OCCUPATIONS.	Whole Number.	Accidents.	Alcoholism.	Apoplexy and Paralysis.	Asthma.	Bladder, Diseases of.	Bowel Diseases.	Brain, Diseases of.	Bronchitis.	Cancer.	Consumption.	Debility.	Diabetes.	Diarrhœa and Dysentery.	Dropsy.	Enteritis.	Epilepsy.	Erysipelas.	Fevers, Malarial.	Fevers, Typhoid, etc.	Heart Diseases.	Influenza.	Insanity.	Kidney Diseases.	Liver Diseases.	Old Age.	Peritonitis.	Pleurisy.	Pneumonia.	Rheumatism.	Septicæmia.	Stomach Diseases.	Suicide.	Tuberculosis.
I. TILLERS OF THE SOIL....	166	4	4	16	1	3	3	4	2	10	13	4	5	3	2	1	..	1	..	1	26	5	1	10	2	18	1	..	21	..	..	2	3	..
II. PROFESSIONAL AND PERSONAL.	72	2	3	6	2	3	1	1	2	6	10	1	..	..	..	..	..	..	..	3	12	..	..	3	2	1	1	..	9	2	..	2	..	..
III. OPTIONAL ACTIVITY......	185	9	1	23	..	1	1	8	9	5	15	5	4	..	1	1	..	3	..	5	26	2	2	22	8	5	3	..	21	1	..	2	2	..
IV. OUTDOOR.—*Local*.	121	7	1	14	1	1	..	3	7	11	11	2	1	..	..	..	..	..	..	4	10	1	..	7	5	6	1	1	24	..	..	..	1	2
V. INDOOR.—*Active*	268	16	4	30	1	3	1	9	7	1	40	1	3	2	1	1	..	1	2	6	36	2	2	28	6	6	6	2	35	1	3	1	7	4

TABLE XII.—OCCUPATIONS AND CAUSES OF DEATH, 1893.—RECAPITULATION, Continued.

OCCUPATIONS.	Whole Number.	Accidents.	Alcoholism.	Apoplexy and Paralysis.	Asthma.	Bladder, Diseases of.	Bowel Diseases.	Brain, Diseases of.	Bronchitis.	Cancer.	Consumption.	Debility.	Diabetes.	Diarrhœa and Dysentery.	Dropsy.	Enteritis.	Epilepsy.	Erysipelas.	Fevers, Malarial.	Fevers, Typhoid, etc.	Heart Diseases.	Influenza.	Insanity.	Kidney Diseases.	Liver Diseases.	Old Age.	Peritonitis.	Pleurisy.	Pneumonia.	Rheumatism.	Septicæmia.	Stomach Diseases.	Suicide.	Tuberculosis.
VI. INDOOR. — *Activity Restricted*	302	18	4	26	..	5	1	10	8	3	85	..	2	3	..	..	..	..	..	4	23	1	1	18	5	7	2	3	53	2	2	7	2	7
VII. OCCUPATIONS AT LARGE	511	48	12	31	1	2	7	13	27	16	76	7	2	7	4	1	1	1	1	22	43	7	..	37	16	16	8	6	83	3	1	7	2	3
VIII. EMPLOYMENTS OF WOMEN	230	8	2	15	2	1	1	2	18	12	40	5	5	2	4	1	..	1	3	3	25	5	1	14	4	10	8	..	29	2	..	5	..	2
ALL CLASSES	1855	112	31	161	8	19	15	50	80	64	290	25	22	17	12	5	1	7	6	48	201	23	7	139	48	69	30	12	275	11	6	26	17	18

TABLE XII.—SUPPLEMENTARY DISEASES.

OCCUPATIONS.	Whole Number.	Appendicitis.	Abscess.	Abscess of Lung.	Abscess of Psoas.	Carbuncle.	Cholera Morbus.	Emphysema.	Gall Stones.	Haematemesis.	Hernia.	Leucocythemia.	Locomotor Ataxia.	Measles.	Meningitis.	Narcotism.	Necrosis of Spine.	Osteo Sarcoma.	Ovarian Tumor.	Pulmonary Emphysema.	Scarlatina.	Syphilis.	Tetanus.	Trichinosis.	Vomiting of Pregnancy.
MALES.																									
Bank Officers	1	1																							
Blacksmiths	2							1														1			
Butchers	1					1																			
Clergymen	1					1																			
Clerks and Salesmen	1													1											
Farmers	2						1		1																
Hotel Keepers	1																					1			
Janitors	1			1																					
Laborers	9						3			1	1		1	1				1						1	
Machinists	1																						1		
Masons	2																			1	1				
Mechanics	1				1																				
Merchants	1	1																							
Motormen (Electric)	1																				1				
Moulders	1														1										
Painters	2																				1	1			
Physicians	1	1																							
Provision Dealers	1													1											

TABLE XII.—SUPPLEMENTARY DISEASES.—Continued.

OCCUPATIONS.	Whole Number.	Appendicitis.	Abscess.	Abscess of Lung.	Abscess of Psoas.	Carbuncle.	Cholera Morbus.	Emphysema.	Gall Stones.	Hæmatemesis.	Hernia.	Leucocythemia.	Locomotor Ataxia.	Measles.	Meningitis.	Narcotism.	Necrosis of Spine.	Osteo Sarcoma.	Ovarian Tumor.	Pulmonary Emphysema.	Scarlatina.	Syphilis.	Tetanus.	Trichinosis.	Vomiting of Pregnancy.
Shoemakers	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
Stable Keepers	1	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..
Students	2	..	..	..	..	..	1	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..
Traders	1	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Watchmen	1	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	36	3	1	1	1	2	5	1	1	1	2	1	1	3	1	1	1	1	..	1	3	3	1	1	..
FEMALES.																									
Boarding-house Keepers	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
Housekeepers	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	..
Total	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	..	..	..	..	1
Grand total	38	3	1	1	1	2	5	1	1	1	2	1	1	3	1	1	1	1	1	1	3	3	1	1	1

RESULTS AND OBSERVATIONS.

GENERAL SUMMARY.

The number of births registered in the State of Rhode Island, during the year 1893, was ten thousand and forty-eight (10,048); the number of marriages, three thousand five hundred and forty-four (3,544); and the number of deaths, seven thousand four hundred and forty (7,440).

Table XIII.

General Results of Registration for ten years, 1854–63, and for each of the last thirty years.

Years.	Whole Number of Births.	Still-born.	Living Births.	Marriages.	Deaths.
1854-1863	38,042	1,471	36,571	14,943	24,230
1864	3,892	138	3,754	1,844	3,360
1865	3,955	177	3,778	1,896	3,405
1866	4,902	172	4,730	2,318	2,970
1867	5,127	163	4,964	2,344	2,889
1868	5.372	212	5,160	2,285	2,912
1869	5,245	220	5,025	2,289	3,382
1870	5,215	234	4,981	2,362	3,238
1871	5,678	223	5,455	2,336	3,344
1872	6,143	202	5,941	2,537	4,247
1873	6,022	228	5,794	2,630	4,403
1874	6,466	277	6,189	2,541	4,229
1875	6,508	246	6,262	2,485	4,317
1876	6,329	224	6,105	2,253	4,116
1877	6,235	242	5,993	2,282	4,450
1878	6,714	248	6,466	2,324	4,411
1879	6,350	216	6,134	2,396	4,472
1880	6,295	192	6,103	2,769	4,829
1881	6,761	264	6,497	2,750	5,016
1882	6,825	253	6,572	2,634	5,074
1883	7,046	253	6,793	2,611	5,282
1884	7,305	272	7,033	2,558	5,141
1885	7,028	271	6,757	2,488	5,389
1886	7,621	293	7,328	2,750	5,849
1887	7,668	276	7,392	2,839	6,340
1888	7,840	295	7,545	3,022	6,591
1889	8,220	329	7,891	3,029	6,259
1890	8,550	296	8,254	3,195	6,934
1891	9,426	272	9,154	3,320	6,620
1892	9,270	343	8,927	3,502	7,396
1893	10,048	412	9,636	3,544	7,440

During the period of forty years there were recorded, in Rhode Island, 238,098 births, of which number 8,914 were still-born, and 229,184 were living children.

During the same period there were recorded 93,076 marriages, or 186,152 persons married, and 168,568 deaths.

These results show that in every 267 births there was one still-born child, or that in every 1,000 births there were about 37 still-born and 963 living children.

The same results also show that the ratio of whole number of living births to the whole number of persons married, and to the whole number of decedents respectively, during the same period, were as follows:

	Of persons married,		Of deaths,
For every 100 living births there were	81.2	and	73.6

The number of births in 1893 was 778 more than the previous year; the number of marriages 42 larger, or 84 more persons married; and an increase of 44 deaths.

For every 100 births there were:

	Of persons married,		Of deaths,
In 1890	77.4	and	83.8
In 1891	72.5	and	72.3
In 1892	78.5	and	82.8
In 1893	73.6	and	77.2

The last decrease in the number of births occurred in 1892, the decrease being 156.

A decrease also occurred in the years 1869, 1870, 1873, 1876, 1877, 1879, 1880 and 1885. The greatest decrease was 364, in 1879.

Table XIV.

Comparative Exhibit of Births, Marriages and Deaths in each Town in Rhode Island, in each of the Six Years 1888—1893, and Excess of Births over the Deaths in 1893.

Towns and Divisions of the State.	Births.						Marriages.						Deaths.						Excess of Births over Deaths.
	1888.	1889.	1890.	1891.	1892.	1893.	1888.	1889.	1890.	1891.	1892.	1893.	1888.	1889.	1890.	1891.	1892.	1893.	
Barrington	27	25	32	26	18	26	12	5	16	7	5	13	20	21	25	24	25	22	4
Bristol	100	104	89	126	93	111	23	37	51	40	48	48	127	86	115	107	102	108	3
Warren	87	102	105	80	87	88	39	33	42	37	36	53	101	101	113	108	105	98	—10
Bristol County	214	231	226	232	198	225	74	75	109	84	89	114	251	208	253	239	232	228	—3
Coventry	103	104	101	125	93	128	33	23	32	26	31	26	81	100	88	100	131	107	21
East Greenwich	73	68	71	71	82	77	26	37	41	39	33	41	69	58	67	58	72	67	10
West Greenwich	20	10	20	16	10	14	4	5	.....	1	.....	.....	14	18	16	14	14	13	1
Warwick	362	424	441	493	480	465	126	159	157	159	171	171	244	281	299	328	381	391	74
Kent County	558	606	639	705	665	684	189	224	230	225	235	238	408	457	470	500	598	578	106
Jamestown	2	5	3	15	20	8	3	5	1	6	6	4	8	4	4	6	18	17	—9
Little Compton	4	20	5	11	7	5	5	11	9	5	8	9	13	8	22	23	23	14	—9
Middletown	29	25	29	28	37	35	5	5	3	7	13	2	22	17	9	24	24	14	21
Newport City	599	712	665	675	488	585	125	135	180	150	151	151	319	323	318	436	401	370	215
New Shoreham	16	28	28	31	29	28	14	7	12	8	11	9	21	20	19	22	35	34	—6
Portsmouth	23	17	20	27	25	13	10	11	9	14	14	14	24	20	21	22	28	19	—6
Tiverton	63	79	68	78	72	81	22	16	18	24	30	19	51	50	49	65	59	46	35
Newport County	736	886	818	865	678	755	184	190	232	214	233	208	458	412	472	598	591	514	241

Table XIV.—Continued.

Towns and Divisions of the State.	Births. 1888.	1889.	1890.	1891.	1892.	1893.	Marriages. 1888.	1889.	1890.	1891.	1892.	1893.	Deaths. 1888.	1889.	1896.	1891.	1892.	1893.	Excess of Births over Deaths.
Burrillville	130	74	86	138	108	127	55	40	34	44	50	45	123	99	106	85	110	112	15
*Cranston	142	154	152	170	159	179	34	42	61	40	38	50	100	103	120	122	125	130	49
Cumberland	208	195	198	161	208	246	77	89	81	71	93	85	177	141	159	167	174	185	61
East Providence	175	115	168	197	203	199	67	65	66	66	67	95	120	130	131	144	159	150	49
Foster	19	23	16	22	12	27	9	12	8	19	19	15	19	25	17	27	23	24	3
Glocester	42	54	44	50	43	38	10	6	8	9	7	12	39	41	46	46	50	28	10
Johnston	197	251	245	176	290	270	33	41	59	57	64	59	161	132	156	106	131	200	70
Lincoln	602	595	657	751	701	761	155	136	145	180	170	181	434	355	462	365	450	451	310
North Providence	35	48	46	43	30	74	3	2	4	2	7	6	38	31	43	46	43	38	36
North Smithfield	60	65	55	58	74	64	25	23	22	23	25	22	42	62	29	39	41	44	20
Pawtucket City	648	655	697	739	726	824	300	278	262	313	331	346	557	524	606	537	642	599	225
Providence City	3.053	3.173	3.146	3.954	3.953	4,194	1,349	1,367	1,408	1,488	1,502	1,608	2,644	2,516	2,876	2,630	2,961	3,141	1,053
Scituate	54	61	81	57	74	68	40	38	44	33	42	30	55	57	48	59	64	64	4
Smithfield	43	47	45	39	28	42	30	23	8	24	22	16	53	53	45	44	53	41	—2
Woonsocket	535	563	570	673	718	805	174	205	201	228	220	239	442	425	428	441	445	438	367
Providence County	5,943	6.073	6,486	7,228	7,322	7,918	2,361	2,367	2,411	2,597	2,747	2,809	5,004	4,694	5,272	4,858	5,474	5,648	2,270
Charlestown	8	17	11	12	9	14	6	5	5	4	5	7	19	9	11	15	19	5	9
Exeter	13	8	14	7	11	6	18	4	12	9	12	11	11	21	13	16	19	17	—11
Hopkinton	47	58	53	41	51	59	31	39	27	30	31	28	50	42	36	38	59	42	17
Narragansett	21	21	22	25	21	18	8	4	4	3	6	9	16	17	17	19	11	12	6
North Kingstown	81	67	61	80	61	90	27	24	31	36	28	22	69	64	51	42	60	51	39
South Kingstown	77	90	79	66	88	103	45	29	57	45	40	32	59	56	60	53	71	66	37
Richmond	29	47	35	33	34	24	6	3	8	10	12	7	26	27	31	20	32	20	4
Westerly	111	116	106	132	132	152	73	65	69	63	64	59	118	102	99	106	97	94	58
Washington County	389	424	381	396	407	466	214	173	213	200	198	175	368	338	318	309	368	307	159
State Institutions	......	......	......	......	......	......	......	......	......	......	......	......	105	120	......	116	133	165	....
Whole State	7,840	8,220	8,550	9,426	9,270	10,048	3,022	3,029	3,195	3,320	3,502	3,544	6,594	6,259	6,934	6,620	7,396	7,440	2,608

* Exclusive of deaths in State Institutions.

The varying numbers of the events of births, marriages and deaths occurring in the different towns, during each of the six years ending December 31, 1893, are very concisely presented in Table XIV, and a ready means is thereby afforded of comparing and studying the changes in the vital movements of the people in the different precincts, during those years.

The increase of population in the State, for the ten years 1880 to 1890, was about twenty-five per cent., or an annual average of two and one-half per cent. Doubtless the increase of population, during 1893, was not less than the average of the previous ten years, and, if so, the increase by immigration must have been nearly twice as large as the natural increase.

Table XV.

Births, Marriages and Deaths in Rhode Island, in 1893, with the number and ratio of each in every 1,000 of the Population of each Town, and the ratio of excess of the Births over the Deaths in every 1,000 of the Population.

TOWNS AND DIVISIONS OF THE STATE.	Estimated Population in 1893.	Births.	Births per 1,000 of Population.	Marriages.	Persons Married pr 1,000 of Population.	Deaths.	Deaths per 1,000 of Population.	Excess of Births per 1,000.
Barrington	1,500	26	17.3	13	17.3	22	14.7	2.6
Bristol	5,322	111	20.9	48	18.0	108	20.3	.6
Warren	4,657	88	18.9	53	22.8	98	21.0	—2.1
Bristol County	11,479	225	19.6	114	19.9	228	19.9	—.3
Coventry	5,225	128	24.5	26	10.0	107	20.5	4.0
East Greenwich	3,408	77	22.6	41	24.1	67	19.7	2.9
West Greenwich	759	14	18.4	......	......	13	17.1	1.3
Warwick	20,446	465	22.7	171	16.7	391	19.1	3.6
Kent County	29,838	684	22.9	238	15.9	578	19.4	3.5
Jamestown	822	8	9.7	4	9.7	17	20.7	—11.0
Little Compton	1,172	5	4.3	9	15.4	14	11.1	—6.8
Middletown	1,147	35	30.5	2	3.5	14	12.2	18.3
Newport City	19,392	585	30.1	151	15.6	370	19.1	11.0
New Shoreham	1,352	28	20.7	9	13.3	34	25.1	—4.4
Portsmouth	1,917	13	6.8	14	14.6	19	9.9	—3.1
Tiverton	2,918	81	27.8	19	13.0	46	15.8	12.0
Newport County	28,720	755	26.3	208	14.5	514	17.9	8.4
Burrillville	5,714	127	22.2	45	15.8	112	19.6	2.6
Cranston *	7,403	171	23.1	50	13.5	130	17.6	5.5
Cumberland	8,646	246	28.5	85	19.7	185	21.4	7.1
East Providence	9,386	199	21.2	95	20.2	150	16.0	5.2
Foster	1,165	27	23.2	15	25.8	24	20.6	2.6
Glocester	2,199	38	17.3	12	10.9	28	12.7	4.6
Johnston	11,280	270	23.9	59	10.5	200	17.7	6.2
Lincoln	22,231	761	31.2	181	16.3	451	20.3	13.9
North Providence	2 448	74	30.2	6	4.9	38	15.5	14.7
North Smithfield	3,231	64	19.8	22	13.6	44	13.6	6.2
Pawtucket	30,469	824	27.0	346	22.7	599	19.6	7.4
Providence City	150,000	4,194	27.9	1,608	21.4	3,141	20.9	7.0
Scituate	2,915	68	23.3	30	20.6	64	22.0	1.3
Smithfield	2,597	42	16.2	16	12.3	44	16.9	—.7
Woonsocket	23,609	805	34.1	239	20.2	438	18.6	15.5
Providence County	283,293	7,910	27.9	2,809	19.8	5,648	19.9	8.0
Charlestown	839	14	16.7	7	16.7	5	6.0	10.7
Exeter	891	6	6 7	11	24.7	17	19.1	—12.4
Hopkinton	2,905	59	20.3	28	19.3	42	14.5	5.8
Narragansett District	1,501	18	12.0	9	12.0	12	8.0	4.0
North Kingstown	4,372	90	20.6	22	10.1	51	11.7	8.9
South Kingstown	5,139	103	20.0	32	12.5	66	12.8	7.2
Richmond	1,624	24	14.2	7	8.6	20	12.3	1.9
Westerly	7,101	152	21.5	59	16.6	94	13 2	8.3
Washington County	24,372	466	19.1	175	14.4	307	12.6	6.5
State Institutions	1,877	8	4.3	......	......	165	87.9	—83.6
Whole State	379,579	10,048	26.5	3,511	18.7	7,440	19.6	6.9

* Not including State Institutions.

BIRTHS. *Proportion to Population.*

In Table XV, on the preceding page, may be found the varying proportions of the number of births, marriages and deaths to every 1,000 of the population in the various towns and cities in the State, as they occurred in 1893.

In regard to births, the extreme range of proportion to population was from 4.3 in every 1,000, in Little Compton, to 34.2 in Lincoln. Following Lincoln, in the line of largest proportion, are Woonsocket, with 34.1; and Middletown, with 30.5. Following Little Compton, in the line of the smallest proportion of births to population, are Exeter, with 6.7 in every 1,000, and Portsmouth, 6.8.

The proportions of births to population in all the counties entire, and in the cities of Providence, Pawtucket, Newport, Woonsocket, and the whole State, during the last seven years are as follows:

BIRTHS TO EVERY 1,000 PERSONS.

	1893.	1892.	1891.	1890.	1889.	1888.	1887.
Bristol County	19.6	17.0	19.9	19.8	19.6	18.1	19.6
Kent County	22.9	23.0	25.3	23.8	26.6	24.6	23.0
Newport County	26.3	23.1	29.7	28.6	29.4	24.4	*20.0
Newport City	30.1	24.4	33.8	34.2	33.5	28.2	30.9
Providence County	27.9	26.9	27.7	27.2	24.8	24.9	†25.0
Pawtucket City	27.0	24.5	25.8	25.2	25.7	25.0	25.0
Providence City	27.9	27.8	29.3	25.9	24.9	24.4	24.3
Woonsocket	34.1	31.2	29.9	27.4	26.2	26.8	28.5
Washington County	19.1	16.8	16.2	16.1	18.3	16.9	20.4
Whole State	26.5	25.2	26.5	24.7	24.1	24.2	24.2

PERSONS MARRIED. *Proportion to Population.*

The proportion to the population, of persons married, can be more correctly shown in counties, or in cities and aggregates of towns, than in single towns.

The following summary will present the proportions in the manner suggested, for the last seven years:

* Newport county towns.

† Providence county towns.

PERSONS MARRIED IN EVERY 1,000.

	1893.	1892.	1891.	1890.	1889.	1888.	1887.
Bristol County	19.9	15.3	14.4	19.1	12.7	12.5	12.8
Kent County	15.9	16.3	16.3	17.2	19.7	16.7	16.8
Newport County	14.5	15.9	14.7	16.3	12.6	12.2	*11.8
Newport City	15 6	16.0	15.0	18.5	12.7	11.7	12.0
Providence County	19.8	20.2	19.9	20.3	19.3	19.8	*15.4
Pawtucket	22.7	22.3	21.9	19.0	21.8	23.5	24.6
Providence City	21.4	22.4	22.0	21.3	21.4	21.6	21.0
Woonsocket	20.2	19 3	20.3	19.3	19.1	17.4	17.2
Washington County	14.4	16.2	16.3	17.1	14.9	18.7	16.6
Whole State	18.7	19.1	18.7	18.5	18.4	18.7	18.0

DEATHS. *Proportion to Population.*

The number of deaths in proportion to the living population, varies considerably from year to year in the different towns. The smaller the towns the greater, generally, is the annual variation.

The highest rate occurred in New Shoreham, that is, 25.1 in every 1,000 of the population; followed by Scituate, 22.0, and Cumberland, 21.4.

Several of the country towns had larger death-rates than either of the cities.

The lowest death-rate was in the district of Charlestown, that is, 6.0 in every 1,000 of the population; followed by district of Narragansett, with 8.0, and Portsmouth, with 9.9.

The following summary will give the ratios of mortality to the population in the cities and counties of the State, during the seven years ending December 31, 1893:

DEATHS IN EVERY 1,000 OF POPULATION.

	1893.	1892.	1891.	1890.	1889.	1888.	1887.
Bristol County	19.9	20.0	20.5	22.1	17.6	21.3	18.2
Kent County	19.4	20.7	18.0	17.6	20.1	18.4	15.5
City of Newport	19.1	20,0	21.8	17.9	15.2	15.0	15.3
Newport County	17.9	20.1	20.6	16.5	14.7	18.0	15.2
Pawtucket	19.6	21.7	18.8	21.9	20.5	21.8	22.3
City of Providence	20.9	20.9	19.5	21.7	19.7	21.0	21.6
Woonsocket	18.6	19.5	19.6	20.5	19.8	22.1	23.4
Providence County	19.9	20.2	18.6	22.1	19.2	21.0	21.0
Washington County	12.6	15.2	12.6	13.5	14.6	16.0	15.5
Whole State	19.6	20.1	18.6	20.7	19.0	20.4	19.9

* County towns.

The proportion of deaths to the living population, in 1893, was larger than the annual average of the previous six years, in Kent and Newport counties and in Newport city; and smaller in Providence and Washington counties, and in each of the cities, Pawtucket and Woonsocket, and about the same in Bristol county and Providence city.

TABLE XVI.

Proportion of Births, Marriages and Deaths to the Population, in the whole State, in each of the last twenty-five years.

YEARS.	BIRTHS.		MARRIAGES.		DEATHS.		
	Number.	Of population one birth in every	Number.	Of population one person married in every	Number.	Of population one death in every	Deaths in every 1,000 of the population.
1869	5,245	41.4	2,289	47.5	3,382	64.2	15.6
1870	5,215	41.7	2,362	46.0	3,238	67.1	14.9
1871	5,676	38.2	2,336	46.5	3,444	65.0	15.4
1872	6,143	35.4	2,537	42.9	4,247	51.2	19.5
1873	6,022	36.1	2,630	41.3	4,403	49.4	20.3
1874	6,466	39.9	2,541	50.8	4,229	61.1	16.4
1875	6,508	39.7	2,485	52.0	4,317	59.8	16.7
1876	6,329	40.8	2,253	57.3	4,116	62.7	15.9
1877	6,235	41.4	2,282	56.6	4,450	58.0	17.2
1878	6,714	38.5	2,324	55.7	4,441	58.1	17.2
1879	6,350	43.6	2,396	57.8	4,472	61.9	16.0
1880	6,295	43.9	2,769	49.9	4,829	57.4	17.5
1881	6,761	40.9	2,750	50.3	5,016	55.1	18.1
1882	6,825	40.5	2,634	52.5	5,074	54.5	18.3
1883	7,046	39.2	2,611	52.9	5,282	52.4	19.1
1884	7,305	41.7	2,558	59.4	5,141	59.2	16.1
1885	7,028	43.3	2,488	61.3	5,389	56.4	17.7
1886	7,621	40.8	2,750	56.5	5,848	53.2	18.8
1887	7,668	41.3	2,839	55.8	6,340	50.0	19.9
1888	7,840	41.1	3,022	53.5	6,594	50.0	20.4
1889	8,220	40.9	3,029	55.4	6,259	52.6	19.0
1890	8,550	40.8	3,195	54.0	6,934	49.8	20.7
1891	9,426	37.7	3,320	53.5	6,620	53.5	18.6
1892	9,270	39.6	3,502	52.4	7,396	49.7	20.1
1893	10,048	37.8	3,541	53.6	7,440	51.0	19.6

During the ten years 1871–1880, the average annual birth-rate was one birth in every 39.7 of the population, or 25.2 births in every 1,000; during the ten years 1881–1890, the average birth-rate was one birth in every 41.0 of the population, or 24.3 in every 1,000, a falling off of a proportion of nearly one birth in every 1,000 of the population.

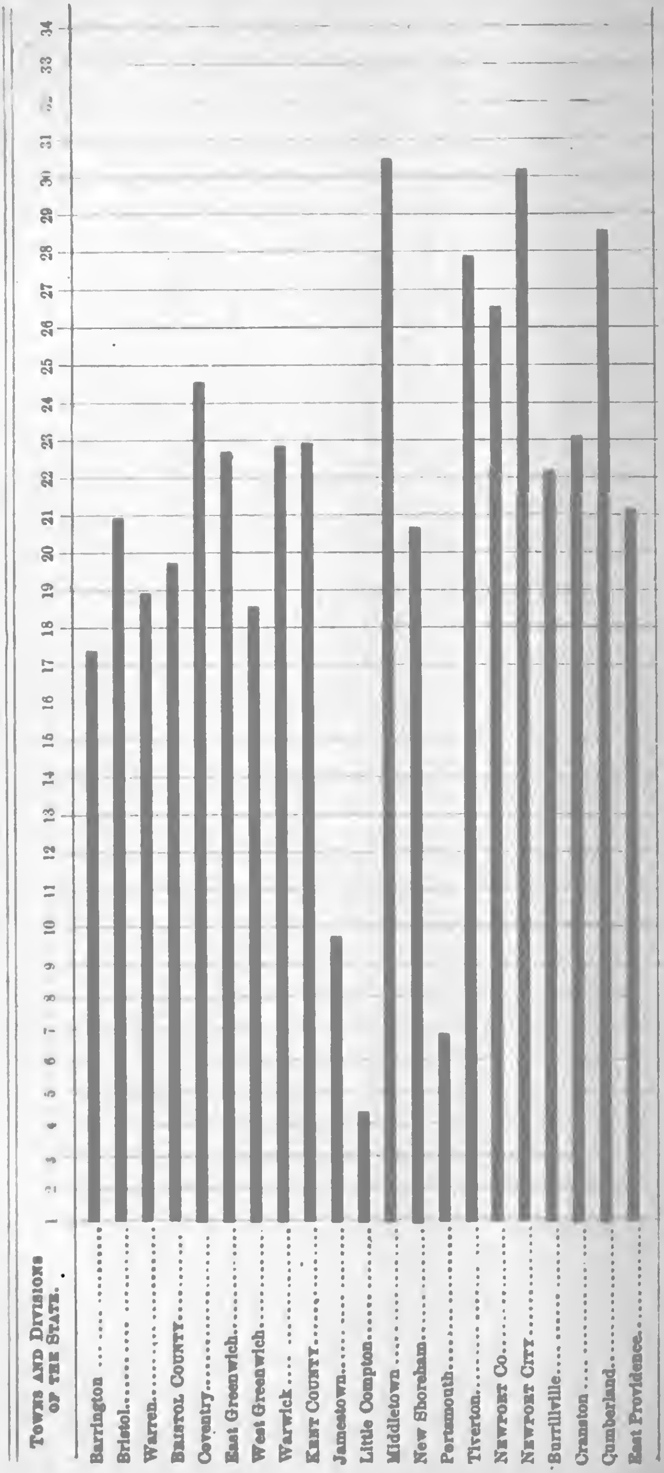
During the period of ten years 1871–1880, the average annual death-rate was one in every 58.4 of the population, or 17.2 in every 1,000, according to the returns. During the ten years 1881–1890 the average annual death-rate was one in every 53.3 of the population, or 18.8 in every 1,000 of the living.

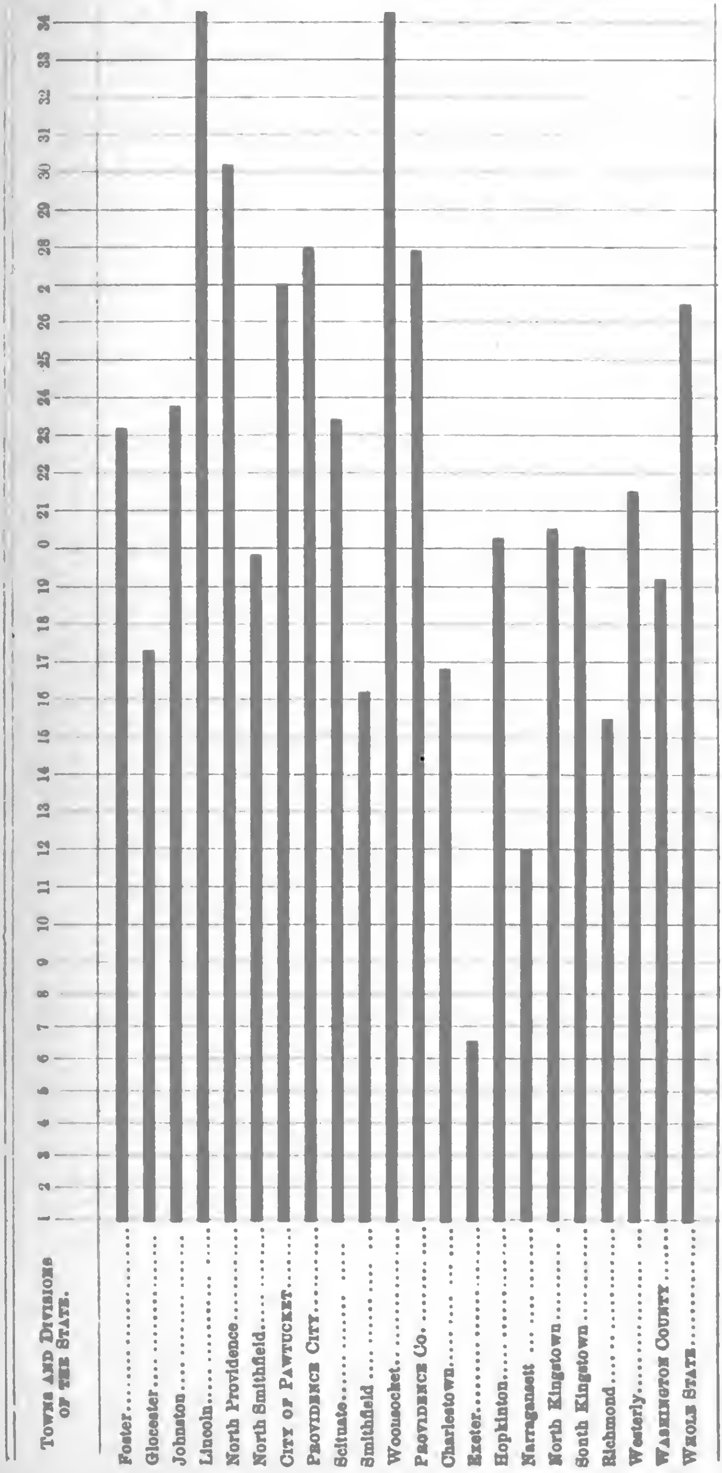
It must be remembered, however, that the returns during the last ten years have been more complete than in previous years.

BIRTH RATES.

Diagram I.—Showing the number of births in every 1000 of the population, in each town and each county in the State during the year 1893, computed upon an estimated increase of the population by the Census of 1890.

For explanation see foot note on next page.





The figures at the top of the perpendicular lines indicate, in whole numbers, the number of births during the year in every 1000 persons. The spaces are fractional parts of one. For instance, the heavy horizontal line against Barrington, at the top of this diagram, reaches across about three-tenths of the space between the perpendicular lines 17 and 18. It shows the birth rate of Barrington, in 1893, was about seventeen and three-tenths in every 1000 of the population.

BIRTHS, 1893.

The general statistics of births in Rhode Island, during the year 1893, derived from the returns sent to the office of the State Registrar, may be found on pages 2 to 8, inclusive, in Tables I, II and III.

The whole number reported is 10,048, as before stated, and is 778 more than the number in 1892.

SEX OF THE CHILDREN.

Of the 10,048 children whose births were registered in 1893, there were 5,105 males and 4,943 females. This gives 103.3 males to each 100 females, or 508.1 males and 491.9 females in each 1,000 children.

The following Table shows the numbers and sex, and the proportions of each sex of the children born in Rhode Island, during the ten years 1854–1863, and in each of the last thirty years:

TABLE XVII.

Years.	Males.	Females.	Males to each 100 Females.	Per 1,000 Births Males. Females.
1854-1863	19,386	18,686	103.6, or	508.8 and 491.2
1864	1,949	1,942	100.3, or	500 9 and 499.1
1865	2,096	1,857	112.9, or	530.2 and 469.8
1866	2,546	2,356	108.0, or	519.4 and 480.6
1867	2,665	2,464	107.0, or	518.7 and 481.3
1868	2,745	2,627	104.5, or	511.0 and 489.0
1869	2,685	2,560	104.9, or	511.9 and 488.1
1870	2,679	2,536	105.6, or	513.7 and 486 3
1871	2,878	2,800	102.8, or	506.9 and 493.1
1872	3,085	3,058	100 8, or	502.2 and 497.8
1873	3,135	2,887	108 6, or	520.6 and 479.4
1874	3,311	3,155	104.9, or	512.1 and 487.9
1875	3,362	3,146	106.9, or	516.6 and 483.4
1876	3,291	3,038	108.3, or	520.0 and 480.0
1877	3,163	3,072	103.0, or	507.3 and 492 7
1878	3,402	3,312	102.7, or	506.7 and 493.3
1879	3,259	3,091	102.4, or	513.2 and 486.8
1880	3,241	3,054	106.8, or	514.8 and 485.2
1881	3,498	3,263	107 2, or	517.3 and 482.7
1882	3,509	3,316	105.8, or	514.1 and 485.9
1883	3,548	3,498	101.4, or	503.5 and 496.5
1884	3,713	3,592	103.4, or	508.3 and 491.7

TABLE XVII.—Continued.

Years.	Males.	Females.	Males to each 100 Females.	Per 1,000 Births Males. Females.
1885	3,591	3,437	104.4, or	510.3 and 489.7
1886	3,897	3,724	104.6, or	511.3 and 488.7
1887	3,968	3,700	107.2, or	517.5 and 482.5
1888	4,023	3,817	105.4, or	513.1 and 486.9
1889	4,193	4,027	104.1, or	510.0 and 490.0
1890	4,351	4,199	103.5, or	508.8 and 491.2
1891	4,926	4,500	109.5, or	522.6 and 477.4
1892	4,765	4,505	105.8, or	514.1 and 485.9
1893	5,105	4,943	103.3, or	508.1 and 491.9

The average proportion for forty years is 104.8 males to every 100 females. At the end of five years from birth the number of each sex is about equal, the males having a larger mortality during that period.

PROPORTION OF THE SEXES. *Localities.*

In Table II, on pages 6 and 7, will be found the number of children born in the different divisions of the State during the year 1893, together with the number of each sex.

The following Table will give more concisely the whole number of children born, arranged according to sex and locality, and the proportion of male children to every 100 female children:

TABLE XVIII.

BIRTHS, 1893.	Bristol County.	Kent County.	Newport County.	Providence County Towns.	Washington County.	Newport City.	Pawtucket.	Providence City.	Woonsocket.	Whole State.
Males	107	345	89	1,054	243	283	433	2,139	412	5,105
Females	118	339	81	1,041	223	302	391	2,055	393	4,943
Total	225	684	170	2,095	466	585	824	4,194	805	10,048
Males to each 100 females	90.7	101.8	109.9	101.2	109.0	93.7	110.7	104.1	104.8	103.3

The proportion of the sexes of children born in 1893 did not vary greatly in the whole State.

Compared with the previous year the decrease in the proportion of male births in the whole State was about 2.5 per cent.

The following Table exhibits the proportions of births of the sexes for the past thirty-one years in the larger divisions of the State and in the whole State:

TABLE XIX.

NUMBER OF MALES TO EACH 100 FEMALES.

BIRTHS.	Bristol County.	Kent County.	Newport County.	Providence County Towns.*	Providence City.	Washington County.	Whole State.
1863	120.0	98.4	97.0	101.8	111.4	108.7	105.8
1864	106.8	87.3	90.6	107.4	97.3	103.1	100.3
1865	119.3	118.2	108.8	118.8	113.8	88.1	112.9
1866	109.4	113.1	103.4	101.9	108.4	124.0	108.7
1867	115.5	98.3	117.8	106.3	101.5	120.1	107.7
1868	117.4	88.7	100.2	101.6	102.4	136.5	104.5
1869	115.7	116.7	102.7	98.0	107.5	120.6	104.9
1870	126.4	111.6	100.0	105.1	104.9	99.5	105.6
1871	131.8	97.9	132.5	100.8	95.2	113.3	102.8
1872	109.2	92.8	109.1	103.5	95.7	110.6	100.9
1873	129.2	113.0	117.9	101.5	109.0	104.7	108.6
1874	98.7	111.9	101.3	110.4	102.9	94.0	101.9
1875	95.2	103.1	97.7	104.3	109.1	131.3	106.9
1876	112.1	101.4	108.5	108.0	106.8	103.7	108.3
1877	138.7	102.4	98.5	100.3	101.9	95.3	103.0
1878	120.5	120.6	94.8	101.5	106.8	78.8	102.7
1879	124.3	95.5	103.6	105.4	105.7	106.3	105.4
1880	117.2	110.5	113.5	102.4	107.6	95.4	106.1
1881	91.2	111.3	102.0	105.9	109.0	115.7	107.2
1882	94.7	110.2	112.5	103.1	106.5	105.7	105.8
1883	94.0	97.6	97.0	103.5	102.2	102.2	101.4
1884	105.0	111.7	92.9	102.5	105.8	99.0	103.4
1885	132.2	107.3	98.0	101.8	103.6	101.3	101.4
1886	120.0	81.7	102.6	106.7	105.0	121.7	104.6
1887	115.1	121.7	106.6	103.9	107.9	106.7	107.2
1888	98.1	105.1	105.0	103.4	107.4	110.2	105.4
1889	81.9	122.0	107.5	103.6	101.4	110.2	104.1
1890	96.5	113.0	106.8	108.5	98.3	97.4	103.6
1891	107.1	110.4	118.4	107.0	109.1	106.4	109.5
1892	120.0	102.1	102.4	110.7	100.0	98.5	105.8
1893	90.7	101.8	97.7	101.1	101.1	109.0	105.8

* Including cities of Pawtucket and Woonsocket.

There will be found in the following summary in the aggregate, the average number of males to each 100 females, born during the thirty-one years from 1863–1893, in the different divisions of the State:

Bristol County* ....104.9 males to each 100 females.
Kent County ....105.8 males to each 100 females.
Newport County.......................................104.8 males to each 100 females.
Providence County Towns*.............................104.9 males to each 100 females.
Providence City ....105 0 males to each 100 females.
Washington County.....................................107.2 males to each 100 females.
Whole State...105.4 males to each 100 females.

BIRTHS AND SEASON.

Table II, on pages 6 and 7 of this report, gives the number of births occurring in the different months of the year, in the several divisions of the State.

According to this Table, the greatest number of births in any one month, in 1893, occurred in December, and the largest in any quarter in the fourth.

The following Table shows the total number of children born in the State of Rhode Island, according to the returns, in each quarter of each of the last six years; and also the aggregate number and the percentage of the aggregate of each quarter in forty years, from 1854 to 1893, inclusive:

TABLE XX.

QUARTERS.	1893.	1892.	1891.	1890.	1889.	1888.	1854 to 1893, inclusive.	
							Number.	Per cent.
January–March....................	2,371	2,233	2,195	1,951	1,864	1,862	56,177	23.59
April–June	2,291	2,179	2,271	2,083	2,021	1,833	56,339	23 66
July–September...................	2,674	2,422	2,451	2,224	2,160	2,081	62,240	26 15
October–December.................	2,709	2,436	2,506	2,292	2,172	2,061	63,342	26.60
Whole year.......................	10,048	9,270	9,426	8,550	8,220	7,840	238,098	100.00

Table XX presents results showing that, according to the registration of forty years, the average proportions of births to the whole number of births in the different quarters of the year, were as follows:

* Including Pawtucket and Woonsocket.

January—March	235.9 in every 1,000 births.
April—June	236.6 in every 1,000 births.
July—September	261.5 in every 1,000 births.
October—December	266.0 in every 1,000 births.

The proportions of births in Rhode Island, in the different quarters of the year, to the whole number of births in 1893, were as follows:

1.	January—March	23.6 per cent., or	236 in every 1,000
2.	April—June	22.8 per cent., or	228 in every 1,000
3.	July—September	26.6 per cent., or	266 in every 1,000
4.	October—December	27.0 per cent., or	270 in every 1,000

First six months	464 births in every 1,000 of whole number.
Second six months	536 births in every 1,000 of whole number.

BIRTHS. *Sex and Season.*

In Table II, on pages 6 and 7, will also be found the number of births of *each sex* by months, as they occurred in the different divisions of the State, during the year 1893. From it we ascertain the number of *each of the sexes* born during each quarter of the year, with their relative proportions, and also the aggregates and proportions of the same for the whole State.

The following Table will present a summary of the quarterly periods, number of births, and proportions of the sexes, for the same year:

	Males.	Females.	Males to each 100 Females.	Per 1,000, each quarter. Males.	Per 1,000, each quarter. Females.
1. January—March	1,218	1,156	105.4	513	487
2. April—June	1,162	1,129	102.9	507	493
3. July—September	1,354	1,320	102.6	506	494
4. October—December	1,371	1,338	102 5	506	494
Whole year	5,105	4,943	103.3	508	492

The following Table shows the number of male children born to every 100 female children, in each quarter of the last three years; and also the proportion of births of male children to each 100 female children born, during five periods of five years each, from 1866 to 1890, inclusive:

TABLE XXI.

YEARS.	1893.	1892	1891.	5 years, 1886–1890.	5 years, 1881–1885.	5 years, 1876–1880.	5 years, 1871–1875.	5 years, 1866–1870.
First Quarter	105 4	104 1	104.4	104.3	105.8	106 0	101.5	106.7
Second Quarter....	102.9	102.1	107.6	105.4	104.8	102.7	104.7	107 3
Third Quarter....	102.6	108 6	118.2	104.6	105.1	107.1	104 8	106.0
Fourth Quarter...	102 5	107.8	107.8	106 5	102 5	108.2	106 5	104.8
Total average....	103.3	105.8	109.5	105.2	104.5	106.2	104.2	106 2

The above Table shows the variation of the proportions of the sexes in the different quarters in the different years, and seems to conclusively determine that season has very little, if any, influence in the causation of sex.

PARENTAGE.

By reference to Table I, page 4, in the division of births there will be found the parentage of the children born in Rhode Island during the year 1893. It will be seen that of the whole number, 10,048, there were 3,303 of native parentage, 4,873 foreign, and 1,872 of mixed parentage.

By mixed parentage is meant the children born of native fathers and foreign mothers, and of foreign fathers and native mothers.

Of native fathers and foreign mothers there were 956, and of foreign fathers and native mothers, 916.

The following Table will show the number and parentage of the children born in the State, and the variations of the same from year to year, in each of the last three years; and also the number and variations occurring in three periods of five years each, and two of ten years each, from 1858 to 1892, inclusive:

TABLE XXII.

PARENTAGE.	1893.	1892.	1891.	5 years, 1888 to 1892.	5 years, 1883 to 1887	5 years, 1878 to 1882.	10years, 1868 to 1877.	10years, 1858 to 1867.
Native father and mother...	3,303	3,123	3,319	16,511	15,001	14,169	25,645	20,321
Foreign father and mother..... ...	4,873	4,396	4,293	18,737	15,245	13,562	26,356	19,665
Native father, foreign mother.. ...	956	875	895	4,021	3,014	2,327	3,135	1,690
Foreign father, native mother.. ...	916	876	919	4,037	3,378	2,887	4,077	1,696
Parentage not stated..............	......	......	.....	....	....	....	....	293
Total...........	10,048	9,270	9,426	43,306	36,668	32,945	59,213	43,665

The following Table of *percentages* will show, in a different and perhaps clearer way, the same changes that have occurred in the proportions of the births in the different classes of parentage during the last three years; and during thirty-five years, from 1858 to 1892, inclusive, in three periods of five years each and two of ten years:

TABLE XXIII.

PARENTAGE.	1893.	1892.	1891.	5 years, 1888 to 1892.	5 years, 1883 to 1887.	5 years, 1878 to 1882.	10 years, 1868 to 1877.	10 years, 1858 to 1867.
Native father and mother	32.87	33.69	35.20	38 25	40.91	43.03	43.36	46.84
Foreign father and mother.........	48.50	47.42	45.50	43 14	41.58	41 23	44.53	45.36
Native father, foreign mother..	9.51	9.44	9.60	9.30	8.30	6.95	5.37	3.89
Foreign father, native mother.....	9.12	9.45	9.70	9.31	9.21	8.79	6.74	3 91
Total....	100.00	100.00	100 00	100 00	100.00	100 00	100 00	100.00

The registration of births, in 1893, is of interest as continuing to show a smaller proportion of children born of native fathers than of foreign fathers. A considerable number of those recorded as native fathers were children of foreign parentage.

The percentage of children of mixed parentage was about the same, in 1893, as in the previous year.

The following Table will present the percentages of children of native and of foreign-born fathers, and of native and foreign-born mothers, respectively, in each of the last three years, and in each of three periods of five years each and two of ten years each, from 1858 to 1892, inclusive:

TABLE XXIV.

CHILDREN WITH	1893.	1892.	1891.	5 years, 1888 to 1892.	5 years, 1883 to 1887.	5 years, 1878 to 1882.	10 years, 1868 to 1877.	10 years, 1858 to 1867.
Native fathers.....	42.38	43.13	41.80	47.56	49.21	50.08	48 73	50.73
Foreign fathers....	57.62	56.87	55.20	52.41	51.79	49.92	51 27	49.26
Native mothers...	41.99	43.14	41 90	47 57	49.91	51 79	50 10	50.75
Foreign mothers.....	58 01	56.86	55.10	52.43	50.09	48.21	49.90	49 25

The percentage of the children born of foreign fathers and of foreign mothers, during 1893, will also be noticed as being very considerably larger than in any previous year.

The number of native fathers of children born in 1893, was 1,530 less than the number of foreign fathers, and the number of native mothers was 1,610 less than of foreign.

BIRTHS OF COLORED CHILDREN.

The number of births of children of colored parentage reported for the year 1893 is 203. This number is 21 more than that of 1892, and 30 more than in 1891.

In regard to sex, the numbers and proportions were as follows, viz.: Males, 91, females, 112; or 81.3 males to each 100 females.

The following summary will show the changes that have occurred from year to year, in the proportions of the sexes of colored children born in Rhode Island, during the last eighteen years:

Years.	Whole Number.	Males.	Females.	Males to each 100 females.
1876-1885	1,762	849	913	93 0
1886	212	117	95	123.0
1887	211	111	100	111.0
1888	202	109	93	117.2
1889	194	87	107	81.3
1890	183	89	94	94.6
1891	173	86	87	98.9
1892	182	94	88	106.8
1893	203	91	112	81.3

The following Table will show the location, number, sex, etc., of colored births during 1893:

Table XXV.

Showing Number, Sex, etc., of Colored Births, 1893.

TOWNS AND CITIES.	Whole Number.	Males.	Females.	COUNTIES.
Bristol	6	4	2	Bristol County ... 6
Coventry	1	....	1	
East Greenwich	7	4	3	
West Greenwich	1	....	1	
Warwick	1	1	....	Kent County ... 10
Little Compton	1	1	....	
NEWPORT CITY	38	15	23	
Tiverton	1	1	....	Newport County ... 40
*Cranston	1	1	....	
East Providence	3	1	2	
Johnston	1	....	1	
Lincoln	2	1	1	
PAWTUCKET CITY	4	1	3	
PROVIDENCE CITY	121	53	68	Providence County ... 132
Narragansett District	1	....	1	
North Kingstown	2	2	....	
South Kingstown	10	5	5	
Richmond	2	1	1	Washington County ... 15
WHOLE STATE	203	91	112	203

NUMBER OF CHILD OF THE MOTHER.

In the following Table will be found the number of the child of the mother born during 1893; that is, how many of the children born were reported as the first, second or third child, etc., of their respective mothers. The statistics on this subject begin with the year 1857, and the following Table includes the children reported during the last six years, and also the total for thirty-seven years, 1857 to 1893, inclusive:

Table XXVI.

Number of the Child of the Mother.	1888.	1889.	1890.	1891.	1892.	1893.	37 years, 1857–1893.
First	1,998	2,082	2,103	2,345	2,383	2,500	55,760
Second	1,545	1,545	1,816	1,899	1,754	1,981	44,964
Third	1,182	1,209	1,253	1,380	1,444	1,484	34,845
Fourth	884	923	924	1,055	1,050	1,138	26,281
Fifth	609	725	699	772	754	825	19,612
Sixth	475	503	515	594	520	608	14,394
Seventh	329	370	364	392	416	449	10,318
Eighth	281	278	294	297	311	297	7,371
Ninth	185	207	187	234	218	224	4,974
Tenth	141	162	156	169	149	160	3,358
Eleventh	83	96	89	114	113	107	2,025
Twelfth	50	47	61	71	75	81	1,300
Thirteenth	38	29	46	40	36	44	724
Fourteenth	21	23	22	26	18	23	366
Fifteenth	9	12	11	17	13	12	202
Sixteenth	4	2	4	6	10	9	101
Seventeenth	2	3	2	0	4	3	59
Eighteenth	3	3	2	2	1	1	26
Nineteenth	1	1	2	2	1	1	14
Twentieth	0	0	0	2	0	0	6
Twenty-first	0	0	0	0	0	1	4
Twenty-second	0	0	0	0	0	0	2
Unstated	0	0	0	0	0	100	100
Total	7,840	8,220	8,550	9,426	9,270	10,048	226,806

There was an increase of 778 in the whole number of births in 1893 from the number in 1892.

In the class of the first child of the mother, the increase was nearly 5 per cent., while in the class of second child of the mother their increase was nearly 13 per cent.

In the class of third child of the mother the increase was nearly 3 per cent.

There are varying differences in the proportions of all classes in the different years.

The most of those in the class "Unstated" (number of the child of the mother) were Italians.

There was one return of birth in each of the eighteenth, nineteenth and twenty-first classes.

The proportion of each class to the whole number will be shown by the following Table, which gives the percentage of the children born in each of the last four years, who were respectively the first, second, third, etc., children of the mothers, and which will also give the aveage percentage of each class of births, during a period of ten years, from 1867 to 1877 inclusive, and of five years, 1878 to 1882, 1883 to 1887, and from 1888 to 1893, inclusive:

TABLE XXVII.

NUMBER OF THE	1893.	1892.	1891.	1890.	5 years, 1888 to 1893.	5 years, 1883 to 1887.	5 years, 1878 to 1882.	10 years, 1868 to 1877.
First	21.88	25 70	21.88	24.59	25.20	24 30	23.1	25.2
Second	19.72	18.92	20.15	21 25	19.77	19.22	18 1	20.7
Third	14.77	15.58	14.67	14.65	14 94	14.82	16.9	15.5
Fourth	11.33	11.33	11.19	10.45	11.10	11.05	12.2	11.4
Fifth	8.21	8.13	8.29	8.17	8.23	8.56	9.1	8 4
First to Fifth	78.91	79.66	79.18	79.11	79.24	77.80	80.0	81.1
Sixth and over and unstated	21.09	20.34	20.82	20.89	20.76	22.20	20.0	18.9
Total	100 00	100 00	100.00	100 00	100 00	100.00	100 0	100.0

PLURALITY BIRTHS.

The general statistics in relation to plural births, in Rhode Island, may be found on page 8, in Table III.

There were ninety-three cases during the year, ninety-one of which were twins and two were triplets, thus making the number of one hundred and eighty-eight children.

Of the 188 children of plural birth, 82 were males, and 106 were females.

The cases occurred in the different divisions of the State as follows: Bristol county, 0; Kent county, 4; Newport county towns, 4; Newport city, 8; Providence county towns, 37*; Providence city, 40; Washington county, 0.

* Including Pawtucket and Woonsocket.

The following exhibit will show the parentage of children of plural birth in Rhode Island, in 1893, and number of each:

Parents both native Americans	32
" " born in Canada	15
" " " England	4
" " " Germany	3
" " " Italy	1
" " " Ireland	12
" " " Russia	1
" " " Sweden	1
" " " Western Islands	1
Native father and Canadian mother	3
Native father and Nova Scotia mother	2
Native father and Irish mother	3
English father and native mother	1
English father and Australian mother	1
English father and Canadian mother	1
English father and Irish mother	4
English father and Scotch mother	1
German father and native mother	1
German father and Polish mother	1
Irish father and native mother	2
Irish father and New Brunswick mother	1
Scotch father and Canadian motner	1
Swedish father and English mother	1
Total births	93
Total children	188

The months in which the plurality births occurred were as follows:

January	18	April	15	July	15	October	20
February	10	May	18	August	16	November	14
March	10	June	16	September	16	December	20
First Quarter	38	Second Quarter	49	Third Quarter	47	Fourth Quarter	54
First half of year	87			Second half of year	101		
Total	18						

The general statistics of births, and number of *cases* reported in Rhode Island during a period of forty years, that is, from 1854 to 1893, inclusive, are as follows:

233,070 cases of single births	giving 233,070 children.
2,476 cases of twin births	giving 4,952 children.
24 cases of triple births	giving 72 children.
1 case of quadruple births	giving 4 children.

Of the whole number of *cases* of child-birth (235,571) during the forty years, one in 95.1 produced twins, one in 9,815 produced triplets, and one in 235,571 produced quadruplets.

Of the whole number of children born during the same period (238,098), ascertained from the reports, one in every 48 was a twin, and one in every 3,307 was a triplet.

Of the 2,501 *cases* of plurality birth which have occurred in the State during the last forty years, there were 999 cases in which both parents were natives; 1,184 cases in which both parents were foreign; 310 cases in which the parents were mixed, that is, one native and one foreign parent; and 8 in which the parentage was not stated.

The whole number of children born in plurality cases, during the forty years, was 5,028, of whom 2,547 were males, and 2,477 were females; the sex of the remaining four was not given.

STILL-BORN.

The whole number of still-born children reported in Rhode Island, for the year 1893, was 412; this number is 41 more than for the year 1892.

The following are the numbers reported from the different divisions of the State:

Bristol County	19
Kent County	9
Newport County Towns	8
Newport City	29
Providence County Towns	70
Pawtucket City	32
Providence City	210
Woonsocket	20
Washington County	15
Whole State	412

The following Table will give the number in each town from which still-births were reported; with the sex, parentage and color:

16

Table XXVIII.

Still-Born, 1893, Locality, Number, Sex, Parentage and Color.

TOWNS AND DIVISIONS OF THE STATE.	Total.	SEX.		PARENTAGE.		COLOR.	
		Males.	Females.	Native.	Foreign.	White.	Colored.
Barrington	1	1	.....	.....	1	1	.....
Bristol	10	6	4	5	5	10	.....
Warren	8	7	1	3	5	8	.....
Bristol County	19	14	5	8	11	19	.....
Coventry	2	1	1	2	.....	2	.....
East Greenwich	1	.....	1	.....	1	1	.....
Warwick	6	4	2	.....	6	6	.....
Kent County	9	5	4	2	7	9	.....
Middletown	1	1	.....	.....	1	1	.....
Newport City	29	18	11	18	11	27	2
New Shoreham	2	1	1	2	.....	2	.....
Tiverton	5	1	4	1	4	5	.....
Newport County	37	21	16	21	16	35	2
Cranston	1	.....	1	.....	1	1	.....
Cumberland	9	7	2	.....	9	9	.....
East Providence	7	3	4	5	2	6	1
Johnston	8	4	4	5	3	8	.....
Lincoln	42	21	21	7	35	42	.....
North Providence	1	1	.....	.....	1	1	.....
Pawtucket	32	18	14	11	21	32	.....
Providence City	210	119	91	88	122	205	5
Scituate	1	.....	1	1	.....	1	.....
Smithfield	1	.....	1	.....	1	1	.....
Woonsocket	20	13	7	12	8	20	.....
Providence County	332	186	146	129	203	326	6
Charlestown	1	1	.....	1	.....	1	.....
Hopkinton	2	.....	2	2	.....	2	.....
North Kingstown	4	4	.....	2	2	4	.....
South Kingstown	3	2	1	3	.....	1	2
Westerly	5	2	3	4	1	5	.....
Washington County	15	9	6	12	3	13	2
Total	412	235	177	172	240	402	10

SUMMARY OF SEX OF STILL-BORN.

The following Table shows the number and sex of the still-born children whose births were reported in Rhode Island during each of the last five years, and also of a period of forty years, extending from January 1, 1854, to December 31, 1893:

TABLE XXIX.

SEX.	1893.	1892.	1891.	1890.	1889.	January 1, 1854, to Dec. 31, 1893.
Males	235	217	158	184	186	5,294
Females	177	154	114	112	143	3,748
Total	412	371	272	296	329	9,042

The average proportions of the sexes of the still-born, for the period of forty-years, were as follows: In every 100 still-births there were about 59 males and 41 females.

Season of Still-Births.—During 1893, and also the thirty-two years from January 1, 1854, to December 31, 1885, the proportions in relation to season, by percentage, were as follows:

	1893.	32 years.		1893.	32 years.
First Quarter	25.73	24.82	Third Quarter	21.60	26.82
Second Quarter	25.00	23.16	Fourth Quarter	27.67	25.20
Per cent. first half of the year	50.73	47.98	Last half of the year.	49.27	52.02

The births of the still-born in the different months of the year, although somewhat variable in number, do not, as a rule, show great discrepancies.

PARENTAGE OF THE STILL-BORN.

Of the 412 still-born children reported in 1893, there were 172 of native, and 240 of foreign parentage, reckoned by the nativity of the fathers, that is, the father's name given; and 174 of native and 238 of foreign, reckoned by the nativity of the mothers, name of father given or not given.

ILLEGITIMATES.

In the following Table will be found the whole number of illegitimate births returned during 1893, with the sex, color, parentage and locality of birth:

Table XXX.

Illegitimates, 1893.

TOWNS.	Whole Number.	SEX. Males.	SEX. Females.	COLOR. White.	COLOR. Black.	PARENTAGE. Native.	PARENTAGE. Foreign.	Almshouses and Penal Institutions.
Bristol	4	3	1	1	3	3	1	......
East Greenwich	2	1	1	.....	2	2	......	......
Middletown	2	2	....	2	.....	......	2	......
Newport City	6	3	3	3	3	4	2	1
New Shoreham	2	......	2	2	......	2	......	......
Cranston	11	8	3	11	.....	6	5	10
Cumberland	1	1	......	1	......	......	1	......
East Providence	1	......	1	1	.....	......	1	......
Glocester	1	1	.....	1	......	......	1	.....
Pawtucket	......	......	.....	......	.....	......	.....	......
Providence City	92	42	50	79	13	51	41	57
Woonsocket	4	2	2	4	......	4	......	......
Exeter	1	......	1	1	......	1	......	......
Hopkinton	1	......	1	1	......	1	.....	......
North Kingstown	1	......	1	1	......	1	......	......
South Kingstown	7	4	3	2	5	7	......	......
Westerly	1	1	......	1	.....	1	......	......
Whole State	137	68	69	111	26	83	54	68

There were returns, during 1893, of 137 children of illegitimate parentage. The number is 42 more than that of the previous year.

Sex.—Of the 137, there were 68 males and 69 females.

Color.—Of the 137 illegitimates born during 1893, 111, or 81.0 per cent., were white, and 26, or 19.0 per cent., were colored.

Parentage.—Of the 137, 83, or 60.6 per cent. of all, were born of native mothers, and 54, or 39.4 per cent., of foreign-born mothers. Forty-nine, or 35.7 per cent., were born in Rhode Island. The colored illegitimates were of native parentage. There were of the 111 white illegitimates, 57 born of native mothers, and 54 of foreign mothers.

The ages of the mothers were as follows:

Age.	No. of Mothers.	Age.	No. of Mothers.	Age.	No. of Mothers.
15	1	22	8	30	1
16	3	23	10	31	2
17	1	24	8	32	2
18	9	25	5	35	2
19	13	26	6	37	1
20	15	27	4	40	2
21	9	28	4	Not given	31
Total					137

Number of Child of Mother.—In 112 cases this was reported as the first child of the mother, in 12 cases the second child, in 5 cases the third, in 3 cases the fourth, in 1 case the fifth, in 2 cases the tenth child, and in three cases the number of the child was not stated.

Sixty-eight of the illegitimates were born of indigent, pauper or criminal mothers, in public, charitable or penal institutions.

Fifty-seven of these births occurred at the Lying-In Hospital in the city of Providence.

The proportion of illegitimates to the whole number of births was about one in every 100 cases, or about eleven in every 1,000 births.

MARRIAGES, 1893.

The number of marriages registered in Rhode Island, during the year 1893, was 3,544. This number is 224 more than in 1891, and 42 more than in 1892.

The general statistics of marriage in 1893, in relation to season and number, in the different divisions of the State, may be found in Table IV, on the ninth page.

The statistics in relation to the proportion to population of persons married in 1893, in each of the towns and general divisions of the State, may be found in Tables XV and XVI, on pages 104 and 107.

The following Table will present the number of marriages, and the ratio of marriage to population, in each year for a period of thirty-four years, 1860 to 1893, inclusive:

Table XXXI.

YEARS.	Number Marriages.	Of Population, one Person Married in every	Persons Married per 1,000 of Population.	YEARS.	Number Marriages.	Of Population, one Person Married in every	Persons Married per 1,000 of Population.
1860.......	1,748	50.0	20.0	1878..	2,324	55.7	17 9
1861.......	1,533	56.8	17.6	1879......	2,396	57 8	17.5
1862.......	1,450	61.1	15.1	1880.... ..	2,769	49.9	20 0
1863.......	1,618	54.7	18.3	1881.......	2,750	50.3	19.9
1864.......	1,844	50 1	19 9	1882.......	2,634	52 5	19 0
1865.......	1,896	48 7	20.5	1883.......	2,611	54.4	18.3
1866.......	2,318	39.9	25.1	1884.......	2,558	58.1	17.2
1867.......	2,344	39 8	25.1	1885.......	2,488	61.3	16.3
1868.......	2,285	40.5	24.8	1886.......	2,750	56.5	17.7
1869.......	2,289	47.5	21.1	1887.......	2,839	55 8	18 0
1870.......	2,362	46.0	21.7	1888.......	3,022	53.5	18.7
1871.......	2,336	46.5	21 5	1889.......	3,029	57.8	17.3
1872.......	2,537	42.9	23.2	1890.......	3,195	54 1	18 4
1873.......	2,630	41.3	24 2	1891.......	3,320	53.5	18.5
1874.......	2,541	50 8	19.6	1892.......	3,502	52 4	19 1
1875	2,485	52.0	19 2	1893.......	3,544	53 6	18.7
1876.......	2,253	57.3	17.5				
1877.......	2,282	56.6	17.7	Annual Average...		52.8	18.9

SEASON.

The following Table will show the number and percentage of marriages in Rhode Island, in each month and each quarter of the year 1893, together with the aggregate number and percentage in each quarter for forty years, viz., from 1854 to 1893, inclusive:

TABLE XXXII.

MONTHS.	Number of marriages each month, 1893.	Number of Marriages each Quarter, 1893.	Percentage of each Quarter to total Marriages, 1893.	Number of Marriages per Quarter, 40 yrs., 1854-1893.	Percentage each Quarter, 40 years.
January	335				
February	267	1st Quarter.. 735	20.74	1st Quarter...20,278	21.86
March	133				
April	368				
May	262	2d Quarter ..1,075	30.33	2d Quarter. ..23,616	25.23
June	445				
July	259				
August	254	3d Quarter.. 796	22.46	3d Quarter. ..21,773	23.39
September	283				
October	343				
November	413	4th Quarter.. 938	26.47	4th Quarter...27,388	29.53
December	182				
Total	......	3,544	100.00	* 93,075	100.00

As in 1892, the largest number of marriages, in any one month, during 1893, occurred in the month of June. For thirty-eight years previous to 1892 the greatest number of marriages was in the month of November.

There was, in 1893, a change from the rule in the proportions of the number of marriages, in the different quarters of the year, to the whole number during the year. The rule has been as follows: The largest proportion in the last quarter; the next largest in the second quarter; followed by the third quarter; and, finally, the first quarter having the smallest proportion of any. In 1893 the largest proportion was in the second quarter.

During 1893 the proportions in the different quarters, from the largest to the smallest, were as follows: Second quarter, 30.33 per cent.; last quarter, 26.47 per cent.; third quarter, 22.46 per cent.; first quarter, 20.74 per cent.

NATIVITY OF PERSONS MARRIED.

The following Table shows the *number* of marriages, according to the nativities of the parties, for each of the last four years, and also

* Including 20, date not given, recorded previous to 1860.

for the aggregate of twenty-five years, from 1858 to 1882, inclusive, of five years, from 1883 to 1887, inclusive, and of five years, from 1888 to 1892, inclusive:

TABLE XXXIII.

BIRTH-PLACE.	1893.	1892.	1891.	1890.	5 years, 1888-1892. Total.	5 years, 1883-1887. Total.	25 years, 1858-1882 Total.
United States	1,577	1,672	1,551	1,555	7,813	7,157	33,553
Foreign countries	1,224	1,100	1,079	951	4,973	3,601	13,753
Native groom, foreign bride	351	343	346	345	1,637	1,323	3,488
Foreign groom, native bride	392	387	344	344	1,645	1,165	3,876
Not stated	......	......	......	......	....	....	64
Total	3,544	3,502	3,320	3,195	16,068	13,246	54,734

It will be understood that in the above enumeration the *parent nativity* of the persons married is not considered, but the country where born.

Parties born in the United States, although children of foreign born parents, are reckoned as natives.

In the following Table are given the *percentages* by birth, of native, foreign and mixed marriages, in each of the last four years and in the aggregate of five years, 1888 to 1892, inclusive, of five years, 1883 to 1887, inclusive, and of twenty-five years, 1858 to 1882, inclusive:

TABLE XXXIV.

BIRTH-PLACE.	1893.	1892.	1891.	1890.	5 years, 1888-1892	5 years, 1883-1887.	25 years, 1858-1882
United States	44.50	47.74	46.72	48.67	48.62	54.02	61.30
Foreign countries	34.54	31.41	32.50	29.76	30.95	27.19	25.13
Mixed nativity	20.96	20.85	20.78	21.57	20.43	18.79	13.57
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00

It will be of some interest to notice that by the exhibit of the two preceding Tables, it is shown that, although the marriages of the native born (whether the issue of foreign born parents or natives) have, as a

rule, *increased in numbers*, they have also steadily *decreased in proportion*, with two or three exceptional years, that is, to the whole number of marriages; while the marriages of the class of the exclusively foreign born, have been, for the past thirty years, gradually increasing in proportion.

The falling off of the percentage of marriages of the class of exclusive foreign born, during 1892, was only a temporary interruption.

Denominational.—The 3,544 marriages in 1893 were performed by clergymen of various denominations, or by civil authority, as follows:

DENOMINATIONAL.

Roman Catholic	1,444	United Presbyterian	10
Baptist	453	Second Advent	8
Protestant Episcopal	432	Advent Christian	5
Methodist	335	Disciples of Christ	5
Congregational	275	Evangelical Advent	4
Free Baptist	116	New Jerusalem	3
Universalist	77	Friends' Ceremony	3
Christian	59	Church of Emanuel	2
Lutheran	53	Church of Christ	2
Presbyterian	46	Independent	2
Hebrew	34	Latter Day Saints	1
Unitarian	31	Swedenborgian	1
Advent	30	Free Religious	1
Justices of Supreme Court	21	Denomination not stated	37
Seventh Day Baptists	20		
Sixth Principle Baptist	20	Total	3,544
Evangelical	14		

AGES OF THE MARRIED.

In the following Table the varying ages of persons married during 1893 are presented:

TABLE XXXV.

AGES OF GROOMS.	AGES OF BRIDES.												Number of Grooms.
	Under 20.	20 to 25.	25 to 30.	30 to 35.	35 to 40.	40 to 45.	45 to 50.	50 to 55.	55 to 60.	60 to 65.	65 to 70.	70 to 75.	
Under 20..........	74	24	4	...	...	...	..	..	..	..	..	..	102
20 to 25.......	332	783	117	16	3	1	..	..	..	..	..	..	1,252
25 to 30............	121	512	379	54	21	1	..	..	..	..	..	..	1,088
30 to 35...........	35	127	161	105	19	9	1	..	..	..	..	..	457
35 to 40............	7	52	91	70	47	11	2	1	1	..	..	2	284
40 to 45...........	3	16	17	45	21	27	6	2	..	..	..	..	137
45 to 50	1	6	7	18	22	17	14	2	1	..	..	..	88
50 to 55	1	1	4	3	11	17	8	8	1	..	..	..	54
55 to 60........	...	2	1	5	5	6	6	6	4	..	..	..	35
60 to 65	...	2	...	2	1	10	6	3	1	6	..	..	31
65 to 70...............	...	....	...	...	...	...	1	2	2	2	1	..	8
70 to 75	...	....	...	1	2	1	1	..	1	..	..	..	6
75 to 80...............	...	....	...	...	...	...	..	..	..	..	..	..	.....
80 to 85		....	...	...	..	...	..	1	..	..	..	..	1
85 to 90......... ..	...	....	..	...	...	...	..	..	1	..	..	..	1
Number of Brides...	574	1,525	781	319	152	100	45	25	12	8	1	2	3,544

The extreme discrepancies in the ages of some couples married in 1893 were not so frequent as in some previous years.

The same results, in 1893, in relation to numbers in the different age periods, may be presented in a different and perhaps clearer way as follows:

TABLE XXXVI.

1893.	Under 20.	20 to 25.	25 to 30.	30 to 35.	35 to 40.	40 to 45.	45 to 50.	50 to 55.	55 to 60.	60 to 65.	65 to 70.	70 to 75.	75 to 80.	80 to 85.	85 to 90.
Males	102	1,252	1,088	457	284	137	88	54	35	31	8	6	....	1	1
Females	574	1,525	781	319	152	100	45	25	12	8	1	2	....	....	....
Total persons	676	2,777	1,869	776	436	237	133	79	47	39	9	8	....	1	1

The whole number of persons in each division of ages, of both sexes, married in Rhode Island in each of the last twenty-eight years, that is, from 1866 to 1893, inclusive, is presented in the following Table:

Table XXXVII.

YEARS.	Under 20.	20 to 25.	25 to 30.	30 to 35.	35 to 40.	40 to 45.	45 to 50.	50 to 55.	55 to 60.	60 to 65.	65 to 70.	70 to 75.	75 to 80.	80 to 85.	85 to 90.	Not stated.
1866	693	1,931	1,025	419	213	127	81	59	25	21	12	1	....	....	....	23
1867	696	1,886	1,101	416	211	148	91	48	37	18	18	5	3	1	....	9
1868	644	1,835	1,050	432	219	133	82	61	30	29	11	8	4	....	....	32
1869	642	1,814	1,051	468	227	134	79	46	35	15	11	2	3	2	....	49
1870	744	1,883	1,084	415	216	159	86	64	26	24	12	3	2	....	....	6
1871	697	1,914	1,118	392	228	115	73	56	35	22	6	7	3	....	....	6
1872	786	2,073	1,182	434	237	131	81	61	43	21	13	6	1	....	....	5
1873	762	2,177	1,156	507	253	140	87	68	35	24	12	6	6	....	....	27
1874	770	1,992	1,179	459	268	159	101	52	36	39	8	9	1	....	....	9
1875	681	2,058	1,108	475	252	150	101	60	32	29	13	4	1	....	....	6
1876	691	1,741	1,041	450	224	154	80	53	27	19	12	1	2	....	....	9
1877	631	1,745	1,118	459	244	125	92	52	46	14	15	11	2	1	....	9
1878	618	1,832	1,123	441	259	162	74	49	39	20	17	2	4	....	...	8
1879	639	1,879	1,156	481	272	123	78	56	39	26	18	9	2	2	1	11
1880	688	2,301	1,262	556	329	163	91	65	33	27	15	3	3	1	....	1
1881	599	2,208	1,410	547	298	187	107	54	34	31	16	5	1	1	....	2
1882	498	2,125	1,377	563	301	161	102	57	36	27	11	5	3	2	....	....
1883	497	2,108	1,370	486	319	183	115	73	31	20	14	3	2	1	....	...
1884	484	2,027	1,289	569	307	152	114	64	48	30	23	6	3	....	....	....
1885	438	1,973	1,296	540	309	163	102	57	45	27	13	7	3	...	1	2
1886	505	2,133	1,552	603	283	174	103	73	24	26	18	5	1	....	....	....
1887	501	2,308	1,552	607	291	162	114	49	39	23	19	7	3	....	....	....
1888	582	2,427	1,608	640	330	207	105	60	36	17	23	7	2	....	....	....
1889	543	2,463	1,492	712	379	182	121	66	45	8	16	9	....	2	....	....
1890	596	2,693	1,632	673	320	206	102	69	41	29	20	7	2	....	....	....
1891	685	3,141	1,412	635	315	158	115	61	35	21	17	6	1	1	....	4
1892	668	3,011	1,729	732	389	201	122	60	35	30	14	4	3	....	....	6
1893	676	2,777	1,869	776	436	237	133	79	47	39	9	8	....	1	1	....

The following summary will show the number of persons married, the number of persons married under twenty years of age, and the percentages of marriages of persons under twenty years of age, during five periods of five years each, that is, from 1870 to 1893, inclusive, and during the year 1893:

	Number of persons married.	Number married under twenty years of age.	Percentage of persons married under twenty years of age.
1870 to 1874	24,812	3,759	15.2
1875 to 1879	23 480	3,260	13.9
1880 to 1884	26,644	2,766	10.4
1885 to 1889	28,256	2,569	9.1
1890 to 1893	33,180	2,494	7.5
1893	7,088	676	9.5

In the following Table will be found the number and proportion of the persons married under 20 years of age, of both sexes, in seven periods of five years each, from 1854 to 1888, inclusive, and for the whole period of forty years:

TABLE XXXVIII.

5-YEAR PERIODS.	Total number of persons married.	Persons married under 20.	Percentage under 20.
1854-1858	13,842	1,932	13.95
1859-1863	16,042	2,500	15.58
1864-1868	21,374	3,049	14.26
1869-1873	24,308	3,631	14.93
1874-1878	23,770	3,391	13.84
1879-1883	26,320	2,921	11.09
1884-1888	27,314	2,510	9.19
1889-1893	33,180	2,494	7.52
40 years, 1851-1893	186,150	22,428	12.05

Per cent., first fifteen years	14.60
Per cent., second fifteen years	13.28
Per cent., last ten years	8.27

PROPORTION OF SEX.

Table exhibiting the percentages of GROOMS in each division of ages, in each of the last thirty-four years:

TABLE XXXIX.

	YEARS.	Under 20.	20 to 25	25 to 30.	30 to 40.	40 to 50.	50 and over.	Total.
GROOMS.	1860	5.0	42.8	26.9	16.3	5.7	3.3	100.0
	1861	4.6	44.5	25.4	15.5	5.8	4.2	100.0
	1862	4.2	37.8	27.9	18.3	5.9	5.9	100.0
	1863	3.5	38.0	29.6	17.2	5.8	5.9	100.0
	1864	4.3	38.8	27.3	17.9	7.4	4.3	100.0
	1865	3.5	37.0	28.4	18.9	7.5	4.7	100.0
	1866	5.3	40.9	27.0	16.4	6.3	4.1	100.0
	1867	4.3	40.1	27.9	16.8	6.8	4.1	100 0
	1868	4.1	39.9	28.2	17.1	6.1	4.6	100.0
	1869	4.3	39.6	27.7	18.5	6 1	3.8	100.0
	1870	4.8	40.4	28.1	16.0	6.4	4.3	100.0
	1871	5.3	40 1	28.9	16.5	4.9	4.3	100 0
	1872	4.3	41.3	28.2	16.6	5.2	4.4	100.0
	1873	3.8	42.4	26.7	17.0	6.0	4.1	100.0
	1874	4.1	40.4	27.2	17.5	6 4	4.4	100.0
	1875	3.5	40.9	27.8	17.6	6.1	4.2	100.0
	1876	5.1	37.5	28.6	17.9	5.6	4.3	100.0
	1877	4.3	36.0	30 2	18.7	5.9	6.9	100.0
	1878	3.9	38.5	29.0	18.0	6.3	4.3	100.0
	1879	3.9	37.8	28.8	19.3	5.4	4.8	100.0
	1880	3.6	38.9	27.5	19.9	5.8	4.3	100.0
	1881	2.8	37.2	29.7	19.5	6.8	4.0	100.0
	1882	2.2	36.0	31.4	20.0	6.1	4.3	100.0
	1883	2.9	36.2	31.7	17.7	7.2	4.3	100.0
	1881	2.5	36.2	29.1	21.0	6.2	5.0	100.0
	1885	2.6	34.7	30.2	20.9	6.8	4.8	100.0
	1886	2.5	35.2	31.9	19.6	6.8	4.0	100.0
	1887	1.7	37.1	31.6	19.6	6.2	3.8	100.0
	1888	2.8	36.1	31.1	19.8	6.5	3.7	100.0
	1889	2.3	37.6	27.8	21.3	6.6	4.4	100.0
	1890	3.3	36.9	30.8	18.9	6.1	4.0	100.0
	1891	3.2	44.7	26.4	17.2	5.2	3.3	100.0
	1892	2.3	40.1	29.3	19.0	6.1	3.2	100.0
	1893	2.9	35.3	30.7	21.0	6.3	3.8	100.0

Table exhibiting the percentages of BRIDES in each division of ages, in each of the last thirty-four years:

TABLE XL.

	YEARS.	Under 20.	20 to 25.	25 to 30.	30 to 40.	40 to 50.	50 and over.	Total.
BRIDES.	1860	25.8	44.1	17.0	9.1	2.6	1.4	100.0
	1861	29.6	42.0	15.2	7.8	4.1	1.3	100.0
	1862	24.9	41.3	16.7	11.8	4.1	1.2	100.0
	1863	24.9	42.6	16.9	9.8	4.1	1.7	100.0
	1864	24.2	43.4	17.8	10.3	2.9	1.4	100.0
	1865	22.6	43.3	19.1	11.0	3.5	1.5	100.0
	1866	24.7	42.9	17.4	11.0	2.7	1.3	100.0
	1867	25.4	40.5	19.3	10.0	3.4	1.4	100.0
	1868	24.4	40.9	18.1	11.6	3.3	1.7	100.0
	1869	24.1	40.5	18.7	12.1	3.4	1.2	100.0
	1870	26.8	39.4	17.9	10.8	3.9	1.2	100.0
	1871	24.6	41.9	19.1	10.1	3.1	1.2	100.0
	1872	26.7	40.5	18.4	9.9	2.2	1.3	100.0
	1873	25.3	40.8	17.5	12.0	2.7	1.7	100.0
	1874	26.3	38.1	19.3	11.1	3.9	1.3	100.0
	1875	23.9	42.1	16.8	11.8	4.0	1.4	100.0
	1876	25.6	39.8	17.6	12.0	3.7	1.3	100.0
	1877	23.4	40.4	18.8	12.1	3.6	1.7	100.0
	1878	22.7	40.4	19.3	12.2	3.8	1.6	100.0
	1879	22.8	40.7	19.4	12.1	3.0	2.0	100.0
	1880	21.1	44.2	18.0	12.0	3.3	1.4	100.0
	1881	19.0	43.0	21.5	11.2	3.8	1.5	100.0
	1882	16.7	44.8	20.9	12.6	3.9	1.1	100.0
	1883	16.2	44.2	20.6	13.2	4.3	1.5	100.0
	1884	16.4	43.0	21.3	13.2	4.2	1.9	100.0
	1885	14.9	44.6	21.8	13.2	3.8	1.7	100.0
	1886	15.8	42.4	24.5	12.5	3.3	1.5	100.0
	1887	15.9	44.1	22.8	12.1	3.5	1.6	100.0
	1888	16.4	44.3	22.1	12.4	3.7	1.1	100.0
	1889	15.1	43.7	21.5	14.7	3.4	1.6	100.0
	1890	15.4	47.3	20.4	12.0	3.6	1.3	100.0
	1891	17.4	49.9	17.0	11.4	3.1	1.2	100.0
	1892	16.8	45.9	20.1	13.0	3.1	1.1	100.0
	1893	16.2	43.0	22.0	13.3	4.1	1.4	100.0

It will be noticed, in the preceding Tables, that the proportions of persons married of both sexes, under twenty years of age, largely decreased during the last decade.

Of grooms, the proportion, compared with the first decade, has decreased about 39 per cent., and of females about 36 per cent.

The proportion of males married, between the ages of twenty and twenty-five, has decreased about 6 per cent., and has correspondingly increased in the more advanced age periods.

The proportion of females married, between twenty and twenty-five years of age, has increased a little more than 6 per cent., while of those between twenty-five and forty there has been an increase of proportion similar to that of males.

NUMBER OF TIMES MARRIED.

There will be found in the following Table the number of grooms and of brides who were married for the first, second, third, etc., time in 1893:

TABLE XLI.

	First Marriage.	Second Marriage.	Third Marriage.	Fourth Marriage.	Fifth Marriage.	Unstated Number Marriage.	Total.
Grooms	2,978	525	39	1	....	1	3,544
Brides	3,113	402	28	....	....	1	3,544

The proportion of *grooms* married for the first time, in 1893, was 84.0 per cent. of the whole number, and the proportion of *brides* married for the first time was 87.8 per cent.

The following Table will show not only the number of times each of the parties were married, but also the number of bachelors and widowers who married spinsters, the number who married widows of first or second widowhood, etc., and of spinsters and widows who married bachelors, and widows of the second, third or fourth marriage, etc.:

TABLE XLII.

GROOMS.	BRIDES.						Total Grooms.
	First.	Second.	Third.	Fourth.	Fifth.	Unstated.	
First marriage	2,784	186	7	.....	.....	.....	2,977
Second marriage	314	192	19	.....	.....	.....	525
Third marriage	14	22	2	.....	.....	.....	38
Fourth marriage	1	1	1	.....	.....	.....	3
Fifth marriage	.....	.....	.....	.....	.....	.....	.....
Unstated marriage	.....	.....	.....	.....	.....	1	1
Total Brides	3,113	401	29	.....	.....	1	3,544

It will be seen, by Table XLII, that 193 bachelors married widows, 7 of whom married brides that had been twice widowed. Of the 566 widowers who married in 1893, 329 married spinsters, and 237 married widows. Of the widows who married widowers, 22 had been twice married previously.

MARRIAGES OF PERSONS OF COLOR.

The number of marriages of persons of color in Rhode Island, in 1893, was 90. This includes three marriages in which one of the parties was white. The number and color of the individuals were, therefore, 177 persons of color and 3 persons white. The white persons were three females. The marriages, however, may be properly included in the above class, inasmuch as the offspring of such marriages are persons of color. There was among the above one marriage of Indians.

The number reported during 1893 from the different towns was as follows, viz.:

East Greenwich	1
Newport City	13
Cranston	1
East Providence	1
Glocester	2
Pawtucket	3
Providence City	62

Narragansett	2
South Kingstown	2
Westerly	3
Total	90

MARRIAGES OF THE DIVORCED.

The following Table will give the towns from which returns of marriage with the facts of divorce were reported during 1893, the whole number of marriages of divorced persons, whether of one or both parties; also whether the second or third marriage of the divorced groom or bride; and number of remarriages of same persons:

TABLE XLIII.

TOWNS.	Number of Marriages.	Number of Divorced Persons Married.	Grooms.	Brides.	Second Marriage of Groom.	Third Marriage of Groom.	Second Marriage of Bride.	Third Marriage of Bride.	Remarriages, Same Parties.
Providence City	101	111	55	56	52	3	52	4	......
Bristol	5	5	3	2	2	1	1	1	......
Coventry	4	4	2	2	2	......	2	......	......
Warwick	3	3	1	2	1	......	1	1	......
Little Compton	2	2	1	1	1	......	1	......	......
Newport	6	6	5	1	5	......	......	1	......
Cranston	3	3	......	3	......	......	3	......	......
Johnston	1	1	......	1	......	......	1	......	......
Woonsocket	6	8	3	5	2	1	5	......	......
Hopkinton	4	5	1	4	1	......	3	1	......
Narragansett	1	1	1	......	1	......	......	......	......
North Kingstown	7	8	2	6	2	......	6	......	......
Westerly	2	2	1	1	......	1	1	......	......
Whole State	148	159	75	84	69	6	76	8	......

There were 148 marriages, in 1893, in which one or both of the parties had been divorced, and in 11 of which both parties had been divorced.

The proportion of the *number of marriages*, of which one or both of the parties had been divorced, to the whole number of marriages, was about one in every 24, or a little more than 4 per cent.

But the proportion of divorced *persons* married during 1893, to the whole number of persons married in the same year, was about one in every 45, about 2.2 per cent., or 22 in every 1,000.

The number of divorced persons married, in 1893, was 22 more than in the previous year.

These 148 marriages of divorced persons were performed by clergymen of the different denominations, or by civil authority, as follows:

Baptist	48	Christian	4
Methodist	24	Presbyterian	4
Universalist	13	Evangelical Advent	4
Free Baptist	11	Justice Supreme Court	4
Congregational	10	United Presbyterian	3
Unitarian	7	Advent Christian	2
Episcopal Protestant	5	Roman Catholic	1
Seventh Day Baptist	5	Not specified	3

DIVORCES, 1893.

According to the returns made to the Secretary of the State Board of Health (State Registrar) by the clerks of the Supreme Courts of the different counties of Rhode Island, the number of applications for divorce, during 1893, was five hundred and twenty-nine (529).

The number of divorces granted, during 1893, was three hundred and one (301).

There were 117 more applications, during 1893, than during the preceding year, and the number of divorces granted was 5 more.

Divorces are decreed for the following seven statute causes, viz.:

1. Adultery.

2. Extreme cruelty.

3. Wilful desertion for five years of either of the parties, or for a shorter period, in the discretion of the court.

4. Continued drunkenness.

5. Neglect or refusal to provide necessaries (having ability) for the subsistence of a wife.

6. Gross misbehavior and wickedness other than aforesaid.

7. Impotency.

Divorces are also decreed, or marriages set aside, in the discretion of the court, for ascertained affinity, consanguinity, idiocy, insanity, penitentiary crimes, and bigamous or otherwise illegal marriage.

The following Table shows the number of applications for divorce, and the number granted, in 1893, in each county of the State; also the causes alleged for the applications:

TABLE XLIV.

COUNTIES.	Number of Applications.	Number Granted.	Causes Alleged.								Total Causes Alleged.
			Adultery.	Extreme Cruelty.	Wilful Desertion.	Continued Drunkenness.	Neglect to Provide Necessaries, &c.	Other Gross Misbehavior.	Void Marriage.	Illegal Marriage.	
Bristol	3	3	1	.....	1	.....	2	3	.....	.....	7
Kent	26	10	2	.....	4	1	1	2	9	1	20
Newport	32	21	6	8	19	8	20	11	.....	.....	72
Providence	429	245	30	44	95	46	152	9	3	.....	379
Washington	39	22	6	5	21	3	4	39	.....	.....	78
Whole State	529	301	45	57	140	58	179	64	12	1	556

There were, during the year 1893, five hundred and twenty-nine (529) applications for divorce, and the whole number of causes alleged was five hundred and fifty-six (556). There was, therefore, an average of little more than one cause alleged in each application. That average is less than the rule of many years.

The causes alleged why divorce should be granted, in the applications during 1893, were 223 less in number than in 1892.

In order to show the actual number of applications, and the number of divorces granted in each of the last twenty-one years, the following summary is presented:

	Applications for divorce.	Divorces granted.	Applications refused or continued or withdrawn.
1873	261	173	88
1874	276	242	34
1875	227	158	69
1876	254	196	58
1877	257	178	79
1878	258	196	62
1879	255	246	9
1880	347	273	74
1881	350	268	82
1882	339	271	68
1883	321	257	64
1884	320	266	54
1885	293	227	66
1886	336	257	79
1887	322	248	74
1888	304	224	80
1889	366	274	92
1890	327	244	83
1891	362	275	87
1892	412	296	116
1893	529	301	228
21 years, total	6,716	5,070	1,646

The average annual proportion of decrees of divorce granted during the last twenty-one years, to the applications therefor, was nearly 75.5 per cent.

During the last ten years the proportions were as follows:

Years	1884,	1885,	1886,	1887,	1888,	1889,	1890,	1891,	1892,	1893.
Per cent	83.0	78.5	76.5	77.0	73.6	74.8	74.6	76.0	71.8	56.9

The proportion of *divorces granted*, in 1893, to the whole number of marriages during the same year, was *one divorce* to every eleven and eight-tenths marriages.

The proportion of *applications for divorce* to whole number of marriages, during the year, was one *application* to every six and seven-tenths marriages.

The following Table shows the number of divorces granted in each county, and in the whole State, in each of the last twenty-five years, and the proportion of marriages to each divorce granted in each year:

TABLE XLV.

YEARS.	Bristol County.		Kent County.		Newport County.		Providence County.		Washington County.		Whole State.	
	Divorces Granted.	Marriages to one Divorce.	Divorces Granted.	Marriages to one Divorce.	Divorces Granted.	Marriages to one Divorce.	Divorces Granted.	Marriages to one Divorce.	Divorces Granted	Marriages to one Divorce.	Divorces Granted.	Marriages to one Divorce.
1869	10	10.6	15	12.5	6	27.7	120	13.8	11	15.5	162	14.1
1870	3	22.7	18	11.8	6	26.3	152	11.3	21	9.3	200	11.8
1871	5	16.8	11	17.9	4	49.7	123	13.3	18	11.4	161	14.5
1872	8	10.2	13	15.7	8	22.9	149	12.6	22	8.9	200	12.7
1873	6	16.2	22	9.8	8	21.9	131	14.8	6	33.7	173	15.2
1874	10	8.9	20	8.0	6	29.0	190	10.0	16	11.6	242	10.5
1875	2	50.0	18	8.8	7	23.4	120	14.9	11	20.5	158	15.7
1876	6	14.5	15	12.8	7	20.5	148	11.1	20	8.8	190	11.5
1877	7	12.0	9	16.3	7	26.0	134	12.1	21	9.9	178	12.8
1878	4	26.0	11	13.3	13	12.8	156	10.9	12	17.3	196	11.9
1879	5	18.8	19	9.0	7	24.1	195	9.1	20	9.7	246	9.7
1880	8	12.1	23	9.4	11	17.6	208	9.7	23	17.0	273	10.1
1881	6	20.1	26	7.3	10	16.9	207	10.0	19	11.0	268	10.4
1882	6	15.0	18	10.3	15	13.0	221	8.9	11	16.2	271	9.7
1883	6	15.8	15	11.5	9	21.2	214	9.2	13	13.3	257	10.2
1884	4	16.7	20	8.0	12	15.7	209	9.3	21	8.2	266	9.6
1885	3	23.0	9	18.6	17	11.2	186	10.1	12	15.0	227	11.0
1886	5	16.0	17	11.0	15	12.3	194	10.9	26	7.3	257	10.7
1887	1	75.0	23	8.0	13	13.1	187	11.8	24	7.9	248	11.4
1888	5	15.8	14	13.5	4	46.0	188	12.5	13	16.5	224	13.5
1889	6	12.5	27	8.3	14	14.0	211	11.2	16	10.8	274	11.1
1890	4	27.5	19	12.1	1	232.0	196	12.3	24	8.8	244	13.0
1891	10	8.4	20	11.2	17	12.6	214	11.2	14	14.3	275	12.1
1892	2	49.5	19	12.4	20	11.6	236	11.6	19	10.1	296	11.8
1893	3	38.0	10	23.8	21	9.9	245	11.5	22	8.0	301	11.8

The ratio of divorces granted in the entire State, during 1893, to the whole number of marriages during the same year, was one divorce to about every eleven and eight-tenths marriages, as previously stated.

During the ten years 1869 to 1878, inclusive, the ratio of divorce to number of marriages was one divorce to every thirteen ; during the ten years 1879 to 1888, inclusive, the ratio was one divorce to every ten and six-tenths marriages.

The average of the last five years was one divorce to about every twelve marriages.

During the twenty-five years 1869–1893, the average proportions of divorce to marriage, in the several counties and the State, have been as follows :

Bristol County	One divorce to every 22.3 marriages.
Kent Connty	One divorce to every 12.1 marriages.
Newport County	One divorce to every 29.2 marriages.
Providence County	One divorce to every 11.4 marriages.
Washington County	One divorce to every 12.4 marriages.
Whole State	One divorce to every 11.8 marriages.

Table showing the Number of Marriages to every Decree of Divorce, in five of the New England States, during the seventeen years from 1877 to 1893, inclusive.

TABLE XLVI.

STATES.	1877.	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.
Rhode Island . .	12.8	11.9	9.7	10.1	10.4	9.7	10.2	9.6	11.0	10.7	11.4	13.5	11.1	13 0	12.1	11.8	11.8
Massachusetts .	23.1	21.4	23.4	26.8	40.9	34.3	27.8	28.2	26.4	30.0	24.5	30.6	26.9	31.8	27.1	28.5	16.9
Connecticut. . . .	10.1	10.7	13.4	13.9	11.6	12 8	12.1	14 9	13.3	14.2	14.9	13.8	10.7	13 2	13.7	13.2	16.6
Vermont	15.0	14.0	21 0	20.0	16.0	17.8	16.4	13.5	28.8	20.0	13.5	16.9	19.6	18.3	17.1	17.4	15.9
New Hampshire	. . . .	. . . .	. . . .	7.7	9.2	10.9	12.8	10.4	10.9	8.3	10.7	8.7	9.8	9.5	9.5	11.7	10.3

DEATHS, 1893.

The number of deaths registered in Rhode Island, during 1893, according to the returns made to the State Registrar, was seven thousand, four hundred and forty (7,440).

This number is larger by 820 than that of the year 1891, and 44 larger than that of 1892.

The death-rate (19.6 in every 1,000 living persons) was five-tenths less than that of the previous year.

The following summary will show the death-rates per 1,000 for each of the last six census years, in comparison with the last five years:

1865.	1870.	1875.	1880.	1885.	1889.	1890.	1891.	1892.	1893.
18.4	14.9	16.7	17.5	17.7	19.0	20.7	18.6	20.1	19.6

Since 1876 the returns have been more complete than previously, and during the last seven years, few deaths have occurred in the State which were not reported.

On the following page will be found the death-rates, by counties, for thirty-four years:

Table XLVII.

Death-rates per 1,000 living, by counties, for thirty-four years, from 1860 to 1893, inclusive; also the average rate of each period of five years each, from 1860 to 1889, inclusive, for the whole State.

YEARS.	Bristol.	Kent.	Newport.	Providence.	Washington.	State.	STATE. ANNUAL AVERAGE OF FIVE-YEAR PERIODS, 1860-1889.
Five years, 1860-1864	16.8	15.4	18.1	17 4	12.1	15.5	...16.5 per 1,000 living.
1865	22.8	16.1	17.5	19.2	14.2	18 4	
1866	19.2	14.2	17 3	16.6	11.4	16.1	
1867	17.0	15.1	15.0	16.4	10.9	15.6	...16.5 per 1,000 living.
1868	15.7	13.7	14.7	17.0	10.0	15.7	
1869	17.9	16.7	13.2	16.0	12.8	15.6	
1870	15.5	13.5	14.1	15.5	12.0	14.9	
1871	16.3	17.5	12.2	15.9	12.3	15.4	
1872	21.1	16.1	14.5	21.2	14.7	19.1	...17.2 per 1,000 living.
1873	18.4	13.8	19.0	22.0	15.1	20.2	
1874	14.7	13.2	10.8	17.7	13.7	16.3	
1875	14.9	14.9	13.5	17.5	15.5	16.7	
1876	14.7	11.7	13.5	16.8	15.9	15.9	
1877	18.2	13.1	12.4	18.7	12.8	17.2	...16.6 per 1,000 living.
1878	17.5	14.2	13 7	18.3	13.0	17.2	
1879	13.2	15.1	14.8	17.2	11.1	16.2	
1880	19.2	14.9	14.5	18.5	12.7	17.5	
1881	17.9	16.5	15 7	19.3	11.9	18.1	
1882	16.5	15.3	17.2	19.7	11.0	18.4	...18.0 per 1,000 living.
1883	17.7	14.6	17.7	20.8	9.8	19.1	
1884	17.7	17.1	14.5	17.8	12.6	16.9	
1885	16.3	16.4	14.5	18.5	14.0	17.7	
1886	19.2	17.5	15.0	19.2	15.0	18.8	
1887	18.2	15.5	15.1	21.1	15.5	19.9	...19.1 per 1,000 living.
1888	21.3	18.4	18.0	21.0	16.0	20.4	
1889	17.6	20.1	14.7	19.2	14.6	19.0	
1890	22.1	17.6	16.5	22.1	13.5	20.7	
1891	20.5	18.0	20.6	18.6	12.6	18.6	
1892	20.0	20.7	20.1	20.2	15.2	20.1	
1893	19.9	19.4	17.9	19.9	12.6	19.6	

Annual average, thirty years, 1860-1889 ....17.3 per 1,000 living.

SEX OF DECEDENTS.

Of the 7,440 persons whose deaths were returned, during the year 1893, 3,789 were males, and 3,651 were females; the ratio standing at 103.8 males to each 100 females, or about 509 males and 491 females in every 1,000 decedents.

The following Table will show the number and proportion of males and females among the *decedents* in Rhode Island, during the ten years 1853 to 1862, inclusive; also in each of the thirty-one years from 1863 to 1893, inclusive, and for the entire period of forty-one years:

TABLE XLVIII.—DEATHS.

	Males.	Females.	Males to every 100 females.
10 years, 1853-1862	10,930	11,269	96.9
1863	1,621	1,586	102.2
1864	1,633	1,727	92.4
1865	1,686	1,719	98.1
1866	1,497	1,473	101.5
1867	1,442	1,447	99.7
1868	1,413	1,499	94.3
1869	1,696	1,686	100.6
1870	1,588	1,650	96.2
1871	1,621	1,723	94.1
1872	2,118	2,129	99.4
1873	2,166	2,237	95.5
1874	2,111	2,118	99.7
1875	2,108	2,209	95.4
1876	1,969	2,147	91.7
1877	2,132	2,318	92.0
1878	2,161	2,280	94.8
1879	2,183	2,289	95.4
1880	2,366	2,463	96.0
1881	2,367	2,549	96.8
1882	2,487	2,587	96.5
1883	2,627	2,655	99.0
1884	2,486	2,655	93.6
1885	2,607	2,782	93.7
1886	2,833	3,016	93.9
1887	3,177	3,163	100.4
1888	3,199	3,395	95.4
1889	3,093	3,166	97.7
1890	3,501	3,433	102.0
1891	3,341	3,279	101.9
1892	3,725	3,671	101.5
1893	3,789	3,651	103.8
41 years	83,773	85,971	97.4

The following Table of *births*, during the same period of time as the preceding, will show by comparison the different proportions of the sexes in the two classes of events:

TABLE XLIX.--BIRTHS.

	Males.	Females.	Males to every 100 females.
10 years, 1853-1862	18,377	17,260	106.4
1863	1,892	1,788	105.8
1864	1,949	1,942	100.3
1865	2,096	1,857	112.9
1866	2,546	2,356	108.0
1867	2,655	2,464	107 0
1868	2,745	2,627	104.5
1869	2,685	2,560	104.9
1870	2,679	2,536	105.6
1871	2,878	2,800	102.8
1872	3,085	3,058	100.9
1873	3,135	2,887	108.6
1874	3,311	3,155	104.9
1875	3,362	3,146	106.9
1876	3,291	3,038	108.3
1877	3,163	3,072	103.0
1878	3,402	3,312	102.7
1879	3,259	3,091	105.4
1880	3,241	3,054	106.1
1881	3,498	3,263	107 2
1882	3,509	3,316	105.8
1883	3,518	3,498	101.4
1884	3,713	3,592	103.4
1885	3,591	3,437	104.4
1886	3,897	3,724	104.6
1887	3,968	3,700	107.2
1888	4,023	3,817	105.4
1889	4,193	4,027	104.1
1890	4,351	4,199	103.2
1891	4,926	4,500	109.5
1892	4,765	4,505	109.3
1893	5,105	4,943	103.3
41 years	122,838	116,524	105.4

SEASON AND MORTALITY.

The whole number of decedents, and the sex of the same, in each month of the year 1893, and in each division of the State, may be found in Table V, on the tenth and eleventh pages.

The influence of season upon mortality may be further illustrated by the following Table, which shows the number and percentage of deaths, compared with the whole number of deaths, in each quarter of each of the last five years, and in the aggregate for thirty-seven years, 1853 to 1889, inclusive:

TABLE L.

SEASONS.	1893.		1892.		1891.		1890.		1889.		37 years, 1853-1889.	
	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.
January-March	1,870	25.13	2,103	28.44	1,425	21.53	2,027	29.23	1,563	24.97	31,928	23.63
April-June......	1,827	24.56	1,624	21.96	1,504	22.72	1,517	20.99	1,426	22.78	28,792	21.31
July-September.	2,074	27.88	2,160	29.20	1,870	28.25	1,952	28.15	1,870	29.87	39,087	29.01
Oct.-December..	1,669	22.43	1,509	20.40	1,821	27.50	1,438	21.63	1,400	22.38	35,288	26.05
Total	7,440	100 00	7,396	100.00	6,620	100.00	6,934	100.00	6,259	100.00	135,095	100.00

Comparing the percentages of 1893 with those of the thirty-seven years, we find the per cent. of the first quarter is 1.5 per cent. larger; the second quarter is 3.2 per cent. larger; the third quarter 1.1 per cent. less; and the last quarter 3.6 per cent. less than for the average of the thirty-seven years. The greatest mortality for any one season of any year is usually found in the third quarter, but in 1890, as will be seen in the above Table, owing in large measure to the epidemic of influenza, the first quarter had the largest mortality.

Table LI.

Showing the Months in the Order of Largest Mortality for Eight Years.

	1893.		1892.		1891.		1890.		1889.		1888.		1887.		1886.	
1.	July	738	January	926	December	783	January	881	August	667	August	772	July	651	August	644
2.	August	719	July	812	August	727	August	715	July	645	July	616	August	647	July	589
3.	April	681	August	739	July	579	July	691	September	558	January	615	September	589	March	515
4.	March	654	September	609	September	564	March	581	March	547	March	582	December	551	September	512
5.	January	644	February	595	October	532	February	565	February	530	September	543	October	520	October	512
6.	May	635	March	582	May	530	April	546	April	495	October	536	November	518	January	488
7.	December	621	May	561	November	506	September	546	January	486	April	526	March	517	April	460
8.	September	617	April	559	April	505	May	519	October	484	February	512	April	517	December	454
9.	February	572	December	528	March	503	October	516	May	470	May	509	January	490	November	428
10.	October	547	June	504	June	469	December	486	December	470	December	500	May	457	May	420
11.	June	511	November	491	January	468	June	452	June	461	June	461	February	441	June	417
12.	November	501	October	490	February	454	November	436	November	446	November	442	June	438	February	410
		7,440		7,396		6,620		6,934		6,259		6,594		6,340		5,849

PARENTAGE OF DECEDENTS.

There may be found in Table I, on pages 2–5, the number of decedents, in 1893, of the two general classes of parentage, that is, native and foreign.

Of the whole number of decedents, 7,440, reported in 1893, 3,101 were of native, and 4,339 were of foreign parentage.

By the term "foreign parentage" is meant the decedents whose fathers were born in some other country and not in the United States. The grandchildren of the foreign born are reckoned as of native parentage, if their fathers were born in the United States.

The following ten towns reported a larger number of decedents of foreign parentage than of native, namely: Warwick, Burrillville, Cumberland, Johnston, Lincoln, North Providence, North Smithfield, Pawtucket, Providence, and Woonsocket; also the State Institutions at Cranston.

These numbers varied from a moderate excess to three or four times as many of foreign as of native parentage.

The following Table gives the number and proportion in every one thousand deaths of decedents of native and of foreign parentage, in each of the last five years; and in the aggregate for thirty-five years, or from 1858 to 1892, inclusive:

TABLE LII.

PARENTAGE.	1893.		1892.		1891.		1890.		1889.		35 years. 1858–1892.	
	Number.	Per 1,000.	Number.	Per 1,000.	Number.	Per 1,000.	Number.	Per 1,000.	Number.	Per 1,000.	Number.	Per 1,000.
Native	3,101	416.8	3,216	431.8	2,928	442.3	3,010	434.1	2,806	448.3	88,338	521.0
Foreign	4,339	583.2	4,180	565.2	3,692	557.7	3,924	565.9	3,453	551.7	81,419	479.0
Total...	7,440	1000.0	7,396	1000.0	6,620	1000 0	6,934	1000.0	6,259	1000.0	169,757	1000.0

AGE OF DECEDENTS.

In Table I, on pages 2–5, may be found the aggregate and average age of all the decedents whose deaths occurred in 1893, and with the age of each sex, in each town and county in the State.

By that Table it will be seen that the average age of all the male decedents in the State, in 1893, was 30.97 years, and that the average age of all the female decedents, in the same year, was 33.99 years; the average age of all decedents, of both sexes, 32.46 years.

The average age of the total decedents in the State, in 1893, was nearly three years less than the average for 1892.

The average age of the male decedents, in 1893, was nearly two years less, and the average age of the female decedents was three and three quarters years less than in the previous year.

The following Table will present, separately, the average age of the male and female decedents, and the average age of all decedents, in each year for thirty-four years; also the average age in six periods of five years each, from 1860 to 1889, inclusive:

TABLE LIII.

YEARS.	Average Age of Males.	Average Age of Females.	Average Age of All.	Average Age, 5-year periods, 1860-1889.
1860	28.51	30.70	29.65	
1861	26.95	30.58	28.82	
1862	29.64	32.65	31.15	29.71
1863	28.29	30.86	29.56	
1864	28.13	30.43	29.40	
1865	26.38	28.97	27.69	
1866	31.13	35.07	33.09	
1867	32.16	35.86	34.01	31.58
1868	30.47	35.08	32.85	
1869	28.62	31.29	30.25	
1870	31.02	32.75	31.90	
1871	32.57	34.43	33.52	
1872	28.41	31.15	29.77	30.30
1873	26.18	28.62	27.42	
1874	28.03	31.66	28.86	
1875	29.72	32.75	31.27	
1876	31.47	33.21	32.37	
1877	29.25	31.56	30.45	31.29
1878	29.02	31.11	30.09	
1879	31.29	33.24	32.29	
1880	29.62	32.06	30.86	
1881	30.99	34.07	32.55	
1882	31.33	35.57	33.50	33.24
1883	33.64	37.41	35.55	
1884	32.29	35.12	33.76	
1885	33.53	35.60	34.59	
1886	33.02	34.91	34.01	
1887	30.97	32.91	31.95	33.81
1888	33.17	35.74	34.53	
1889	32.20	35.74	34.00	
1890	31.01	34.26	32.62	
1891	32.70	36.28	34.47	
1892	32.96	37.75	35.34	
1893	30.97	33.99	32.46	

The above Table shows that the average longevity of the decedents in Rhode Island increased over three years, during a period of twenty-five years, ending with 1884, and of about four and one-half years increase, as the average of the five years preceding 1893.

The following Table will present some of the facts of the preceding as occurring in the different divisions of the State, as well as of the State at large. It will show the average age of the decedents in each of the larger divisions of the State, in each of the last four years, and also the average of each of seven periods of five years each, comprising the thirty-five years from 1858 to 1892, inclusive:

TABLE LIV.

DIVISIONS OF THE STATE.	1893.	1892.	1891.	1890.	1888–1892, 5 years.	1883–1887, 5 years.	1878–1882, 5 years.	1873–1877, 5 years.	1868–1872, 5 years.	1863–1867, 5 years.	1858–1862, 5 years.
Bristol County.	45.55	41.89	41.39	42.17	39.76	38.45	36.68	33.61	35.12	34.78	35.56
Kent County....	28.95	34.81*	32.62	31.01	32.22	37.66	37.11	36.20	34.77	35 81	32.15
Newport County........	39.11	40.37	39.95	39 66	40.63	42.41	39.21	40.68	40.04	33.54	35.01
* Providence County.....	29.24	32.42	32 43	31.00	31.67	31.83	30.60	28.46	25.26	29 16	28.44
Providence City..........	31.16	34.13	33 39	31 86	33.44	32.19	29 50	27.19	25.45	28.50	25.78
Washington County	48.30	48.47	47.81	44 67	46.77	43.39	41 01	41.14	39.67	30.87	34.21
Whole State	32.46	35.34	31.47	32.62	34 19	33.97	31.86	30.28	31.66	30.73	29.42

By reference to Table LIV, it will be seen that the average age of all decedents during the last four years is a little more than four and one-quarter years greater than the first period of five years, 1858–1862, notwithstanding the low average of 1893.

PERCENTAGE OF DECEDENTS BY DIFFERENT AGES.

In Table VI, on pages 12 to 17, inclusive, will be found the number of deaths in 1893, in each town and each county, of each sex, and in each period of life, with the percentage of the whole number of deaths in each division to the population of the same by estimation from the census of 1890.

The following Table shows the percentages of decedents in each division of ages, to whole number of deaths, in each of the last six years, and in the aggregate for three periods; one of twenty years and seven months, from June 1st, 1852, to December 31st, 1872, inclusive; one of ten years, from 1873 to 1882, inclusive; and one of ten years, from 1883 to 1892, inclusive:

* Exclusive of Providence city.

Table LV.

Periods of Life.	1893.	1892.	1891.	1890.	1889.	1888.	10 years, 1883 to 1892.	10 years, 1873 to 1882.	20 years, 7 months, 1852 to 1872.
Under 1 year	23.2	22.0	22.6	22.6	21.0	19.3	20.4	18.9	17.8
1 and under 2	5.2	4.9	5.4	5.8	5.9	5.9	5.6	7.6	8.8
2 and under 5	5.3	4.0	4.6	5.7	5.4	6.6	5.8	8.4	8.7
Total under 5	33.7	30.9	32.6	34.1	32.3	31.8	31.8	31.9	35.3
5 and under 10	3.9	2.4	2.5	3.2	3.6	4.2	3.5	5.0	4.8
10 and under 20	4.5	4.8	4.0	4.5	5.4	5.7	5.1	5.8	6.0
20 and under 30	7.9	8.3	8.5	8.4	8.3	9.0	8.7	9.2	9.6
30 and under 40	8.0	8.2	8.4	8.3	7.5	7.5	7.9	7.8	8.4
40 and under 50	8.4	8.0	7.7	7.5	7.9	7.9	7.5	6.9	7.3
50 and under 60	8.9	9.0	9.2	8.5	8.3	8.4	8.5	7.2	7.0
60 and under 70	10.0	11.0	10.3	9.3	9.8	9.5	9.7	8.2	7.6
70 and under 80	8.9	9.9	9.9	9.6	10.1	9.0	9.9	8.8	7.2
80 and under 90	4.8	6.3	5.6	5.5	5.6	5.6	5.9	5.1	5.1
Over 90 and not stated	1.0	1.2	1.3	1.1	1.2	1.4	1.5	1.1	1.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Compared with the average of 30 years, ending with 1882, the average proportion of the mortality of children under one year of age, during the last eight years, was 2.3 per cent., or about 23 in every one thousand deaths more than the average in the longer period.

Compared with the previous year the proportion of decedents, in 1893, under one year of age, was more than 1.2 in every one hundred larger.

There was a decrease of percentage in the age periods above fifty years.

The following Table will present the varying proportions of deaths to whole number of deaths, in four different periods of life, from 50 years of age to 90 years, grouped in three periods of averages of ten years each, and one period comprising the ten years, 1883–1892, and in 1893:

TABLE LVI.

AGE OF DECEDENTS.	1st Decade, 1852–1862.	2d Decade, 1863–1872.	3d Decade, 1873–1882.	4th Decade, 1883–1892.	1893.
50 to 60	6 7 per cent.	7.3 per cent.	7.2 per cent.	8 5 per cent.	8.9 per cent.
60 to 70	6 9 "	8.3 "	8.2 "	9.7 "	10 0 "
70 to 80	7.3 "	8 4 "	8.8 "	9.9 "	8.9 "
80 to 90	4 6 "	5.4 "	5.1 "	5.9 "	4.8 "

COLORED DECEDENTS.

There were 250 deaths of persons of color during 1893.

The towns from which they were returned and number in each were as follows:

Providence City	147
Newport City	35
Cranston (State Institutions)	15
Bristol	4
Coventry	1
East Greenwich	7
Warwick	5
Jamestown	3
Little Compton	1
New Shoreham	2
East Providence	6
Johnston	2
Lincoln	1
Pawtucket	3
Scituate	1
Smithfield	1
Woonsocket	1
Hopkinton	2
Narragansett	2
North Kingstown	2
South Kingstown	6
Westerly	3
Total	250

Season.—The deaths in the different months were as follows:

Months.	Deaths.	Months.	Deaths.	Months.	Deaths.	Months.	Deaths.
January	20	April	18	July	27	October	23
February	17	May	20	August	23	November	16
March	27	June	19	September	22	December	18
First Quarter	64	Second Quarter	57	Third Quarter	72	Fourth Quarter	57

First six months, 121; Second six months, 129; Total, 250.

The following summary will show the proportion, to the whole estimated colored population, of each of the events of birth, marriage and death of colored persons, during the sixteen years from 1878 to 1893, inclusive:

	One Birth in every	One Person married in every	One Death in every
1878	36.4	39.2	40.2
1879	39.6	51.4	37.3
1880	47.1	43.3	44.0
1881	34.3	39.2	35.4
1882	36.8	44.5	45.4
1883	33.4	63.3	39.7
1884	34.8	46.0	34.5
1885	36.7	51.7	40.1
1886	34.6	43.2	37.8
1887	35.8	38.9	37.2
1888	37.6	55.0	38.0
1889	38.7	52.0	40.0
1890	45.3	57.6	41.0
1891	42.8	44.2	36.4
1892	40.6	38.5	31.3
1893	38.6	44.2	31.3

In every one thousand of the colored population there were, in 1893,

Of Births.	Of Persons Married.	Of Deaths.
25.9	22.6	31.9

The following exhibit will show the number of living births, marriages and deaths among the colored population of Rhode Island, during ten years, from 1861 to 1870, inclusive; 10 years, from 1871 to 1880, inclusive; 10 years, from 1881 to 1890, inclusive; and for 1891, 1892 and 1893, and the aggregate of the same:

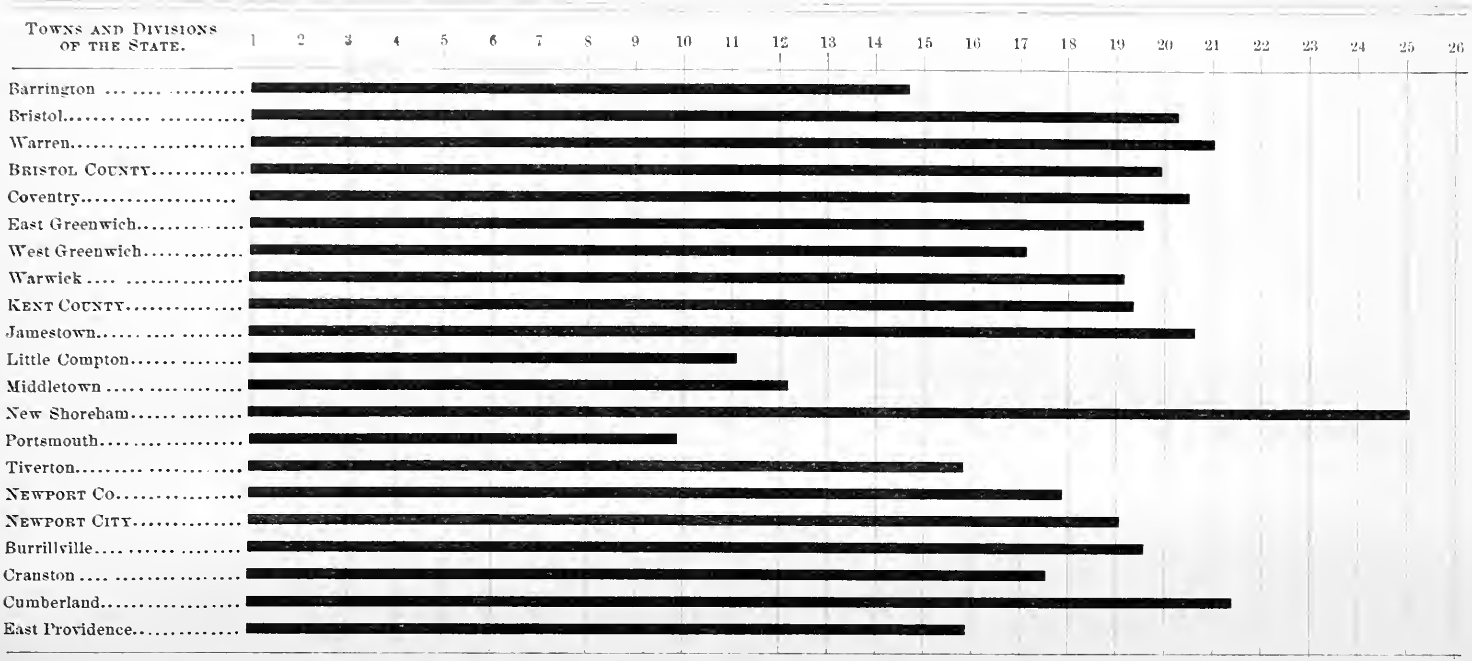
10 years, 1861–1870	1,131 births	557 marriages	1,153 deaths.
10 years, 1871–1880	1,615 births	705 marriages	1,573 deaths.
10 years, 1881–1890	1,954 births	752 marriages	1,860 deaths.
1891	173 births	95 marriages	204 deaths.
1892	182 births	98 marriages	236 deaths.
1893	203 births	90 marriages	250 deaths.
Total, 33 years	5,258 births	2,297 marriages	5,276 deaths.

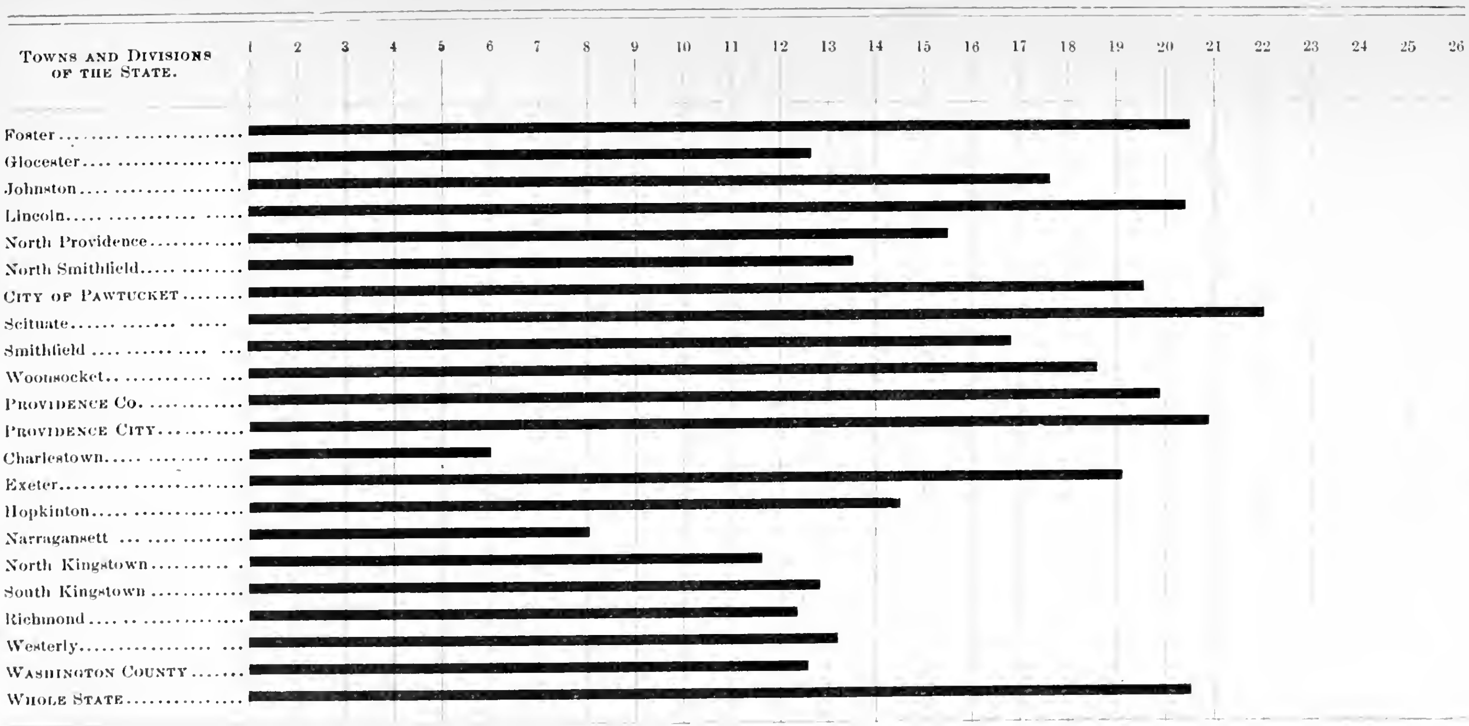
During the first ten years (1861–1870) there were twenty-two more deaths than births; during the second ten (1871–1880) forty-two more births than deaths; during the last ten years (1881–1890) ninety-four more births than deaths. For the thirty-two years previous to 1893 there was an average excess of less than one birth a year over the deaths. During 1891 the number of births was 31 less than the number of deaths. During 1892 the number of births was 54 less than the number of deaths. In 1893 the number of births was 47 less than the number of deaths. Still-born not included with births nor deaths.

DEATH RATES.

Diagram II.—Showing the number of deaths in every 1000 of the population, in each town and each county in the State during the year 1893, computed upon an estimated increase of the population by the Census of 1890.

For explanation see foot note on next page.





The figures at the top of the perpendicular lines indicate, in whole numbers, the number of deaths during the year in every 1000 persons. The spaces are fractional parts of one. For instance, the heavy horizontal line against Barrington, at the top of this diagram, reaches across about seven-tenths of the space between the perpendicular lines 14 and 15. It shows the death rate of Barrington, in 1893, was about fourteen and seven-tenths in every 1000 of the population.

CAUSES OF DEATH, 1893.

The statistics of the causes of death in Rhode Island, in 1893, may be found in Tables VII, VIII, IX and X. The whole number of deaths, as previously stated, was 7,440, which was but 44 more than the number returned in 1892, and 820 more than the number reported in 1891. The number of which the cause of death was reported was 7,372, and the number of which the cause was not stated was 68.

The following Table shows the number of deaths in 1893, in each large division of the State, and the number and proportion in each division from which causes were reported unknown :

TABLE LVII.

	Bristol County.	Kent County.	Newport County Towns.	Providence County Towns.	Washington County.	Newport City.	Pawtucket.	Providence City.	Woonsocket.	Whole State.
Number of Deaths	228	578	144	1,635	307	370	599	3,141	434	7,440
Cause not stated	1	6	8	21	1	......	13	14	4	68
One in	228	96	18	78	307	......	46	224	109	109

TABLE LVIII.

Proportion of Deaths reported with "Cause Unknown" in each Division of the State, for a period of thirty-nine years, from 1855 to 1893, inclusive.

YEARS.	STATE DIVISIONS.							In every 1000 Deaths.
	Bristol County.	Kent County.	Newport County.	Providence County.*	Providence City.	Washington County.	Whole State.	
1855-1859, One in every	19.8	7.6	15.4	5.8	34.3	5.3	9.0	111.1
1860-1864, One in every	25.7	10.6	17.8	8.4	35.3	25.1	14.7	68.0
1865-1869, One in every	60.2	12.6	28.7	7.1	58.8	21.3	14.0	71.4
1870-1874, One in every	43.7	27.5	16.2	10.8	84.6	19.0	19.2	52.1
1875, One in every	55.0	7.4	15.6	13.7	91.2	11.9	20.9	47.8
1876, One in every	11.5	7.9	18.5	9.9	124.3	22.8	19.3	45.8
1877, One in every	201.0	17.7	9.7	11.9	323.0	16.0	23.2	43.1
1878, One in every	32.1	7.1	9.0	13.7	124.2	21.7	21.1	47.4
1879, One in every	16.6	9.2	12.4	9.5	225.1	8.6	17.6	56.8
1875-1879, One in every	63.2	9.9	13.0	11.7	177.6	16.2	20.4	49.0
1880, One in every	21.9	23.5	13.5	10.5	122.3	17.8	20.7	48.3
1881, One in every	201.0	13.0	11.2	7.3	143.0	6.5	14.4	69.4
1882, One in every	37.6	11.6	10.9	10.6	187.0	7.7	18.8	53.2
1883, One in every	40.4	15.9	15.0	15.3	392.8	17.0	28.4	36.2
1884, One in every	100.0	40.0	81.6	91.7	372.1	94.0	122.4	8.2
1880-1884, One in every	80.8	20.8	26.4	27.1	243.4	28.6	40.9	24.5
1885, One in every	185.0	355.0	137.0	45.6	309.1	52.2	91.3	10.9
1886, One in every	110.5	192.5	86.0	87.0	195.1	55.2	113.7	7.9
1887, One in every	212.0	343.0	73.5	782.6	261.0	351.0	333.7	3.0
1888, One in every	251.0	408.0	152.7	164.3	293.8	368.0	235.7	4.3
1889, One in every	208.0	152.0	221.0	176.7	120.0	338.0	160.0	6.2
1885-1889, One in every	193.5	389.0	131.0	251.2	236.4	233.0	168.8	6.4
1890, One in every	....	....	236.0	109.0	190.0	159.0	161.0	6.2
1891, One in every	....	....	598.0	159.0	175.0	154.0	194.0	5.1
1892, One in every	....	....	591.0	240.0	212.0	181.0	264.0	3.8
1893, One in every	228.0	96.3	64.2	70.2	224.0	307.0	109.0	9.1

* Not including Providence city.

Table LIX.

Exhibiting the Order in regard to Number and Proportion of Decedents from Thirteen Principal Causes of Death.

1893.	1892.	1891.	1890.	1889.	1888.	June 1st, 1852, to Dec. 31st, 1887—35 yrs. 7 mos.	Per 1000 of Whole No. of Deaths, 35 years, 7 months.
Whole Number...7,440	Whole Number..7,396	Whole Number ..6,620	Whole Number ..6,934	Whole Number ..6,259	Whole Number..6,594	Whole Number..129,231	
Pneumonia...... 776	Consumption.....759	Consumption.....740	Consumption.....852	Consumption..... 727	Consumption.... 800	Consumption 19,847	154.3
Consumption...... 722	Pneumonia........655	Pneumonia 568	Cholera Infantum..582	Pneumonia....... 483	Pneumonia 508	Pneumonia. 8,298	64.5
Cholera Infantum.. 603	Cholera Infantum..633	Cholera Infantum..546	Pneumonia....... 569	Heart, Diseases of 460	Cholera Infantum 467	Old Age. 6,797	53.0
Heart Diseases..... 535	Heart Diseases.... 506	Heart Diseases.....480	Heart, Diseases of.405	Cholera Infantum .396	Heart, Diseases of 467	Cholera Infantum..6,821	53.1
Apoplexy........ 407	Apoplexy..........362	Apoplexy 335	Apoplexy 341	Apoplexy 323	Apoplexy....... 367	Scarlatina 4,971	38.5
Bronchitis......... 315	Influenza. 336	Bronchitis..........247	Bronchitis. 275	Bronchitis. 260	Old Age 290	Dysentery and Diarrhœa....... 5,166	40.1
Kidney Diseases .. 302	Accidents..........309	Kidney Diseases...245	Accidents....... 250	Old Age 227	Brain, Diseases of..284	Heart, Diseases of..5,642	43.6
Accidents 261	Bronchitis..........308	Accidents........ 233	Kidney, Dis. of....229	Accidents. 216	Fever, Typhoid....235	Fevers, Typhoid, &c 4,632	36.1
Brain Diseases ... 257	Kidney Diseases...258	Brain Diseases .. 222	Brain, Diseases of..217	Kidney, Dis. of ...210	Bronchitis. 228	Apoplexy and Paralysis 5,050	39.2
Cancer 205	Old Age...........256	Old Age 185	Diphtheria. 211	Cancer. 189	Kidney, Dis. of . 213	Accidents, all kinds 3,921	30.3
Scarlatina 193	Brain Diseases.....246	Diphtheria. 177	Old Age 198	Brain, Diseases of..189	Scarlatina 207	Diphtheria*....... 3,777	29.2
Old Age 183	Cancer........... 181	Cancer. 177	Influenza 168	Diphtheria........184	Cancer. 193	Convulsions. 2,859	22.1
Diphtheria .. 157	Fever, Typhoid . 133	Fever, Typhoid . 149	Cancer. 165	Diarrhœa and Dysentery 159	Diphtheria. 191	Croup. 2,461	19.1

* 30 years, 1858 to 1887, inclusive.

From pneumonia there was an increase of 121 deaths over that of the previous year, or about 18.5 per cent. The fatality from pneumonia has been slowly increasing, in proportion to whole number of deaths, for the last twenty years.

The number of deaths from consumption, in 1893, was 37 less than in the previous year.

From cholera infantum there was a decrease of 30 deaths from 1892, but the tendency for the previous fifteen years has been toward a considerably increased proportion.

Diseases of the heart have also been on the increase as causes of death, for fifteen years and more, the mortality in 1893 being the largest ever recorded in this State.

There was a decrease of 73 deaths from old age in 1893.

During the last fifteen years, apoplexy, bronchitis, and kidney diseases have, as well as those mentioned above, increased in proportion as causes of death, and typhoid fever, diarrhœa and dysentery have decreased.

COMPARATIVE STATISTICS

AND

COMMENTS.

There have been presented in the preceding pages, numerically and in tabular form, the different causes of death in Rhode Island, in 1893, with various summaries and illustrations. In Tables VII and VIII they were presented at considerable length, in various specific terms; in Table IX more or less grouped in a general nosological arrangement; and in Table X the same for a period of forty-one years.

In Table VII the number of deaths from *each cause* and of *each sex* is shown, for *each month* in the year, and the *parentage* of the decedents from *each cause* during the year.

In Table VIII the number of decedents of *each sex* from *each cause*, in the *different periods of life*, is given.

In Table IX, with the classification and percentage of causes of death, the number of each general cause, in each division of larger population, is given.

In Table X a nosological summary of causes of death for the whole State, in each of forty-one years, is given.

Table LX is a compend in part of Tables VII, VIII and IX, previously alluded to, and contains the particulars of the most important causes of death in 1893, and comprises the principal causes which will be commented upon in the following pages:

TABLE LX.

Deaths in Rhode Island from Twenty-five Principal Diseases.

		Accidents and Negligence.	Apoplexy and Paralysis.	Brain Diseases.	Bronchitis.	Cancer.	Cholera Infantum.	Consumption.	Croup.	Diarrhœa.	Diphtheria.	Dysentery.	Enteritis.	Fever, Typhoid.	Heart Diseases.	Influenza.	Kidney Diseases.	Liver Diseases.	Measles.	Old Age.	Peritonitis.	Pleurisy.	Pneumonia.	Rheumatism.	Scarlatina.	Stomach Diseases.	Whooping Cough.
Total mortality		264	407	257	315	205	603	722	50	117	157	42	68	115	535	85	302	72	100	183	74	22	776	40	193	17	23
SEX.	Males	195	206	139	164	54	324	364	29	61	75	18	37	65	264	34	154	43	56	72	31	14	412	20	86	6	8
	Females	69	201	118	151	151	279	358	21	56	82	24	31	50	271	51	148	29	44	111	43	8	364	20	107	11	15
PARENTAGE.	Native	88	227	116	105	124	186	230	13	42	57	14	28	41	264	47	141	30	33	113	28	9	319	14	75	5	9
	Foreign	176	180	141	210	81	417	492	37	75	100	28	40	74	271	38	161	42	67	70	46	13	457	26	118	12	14
SEASON.	January	31	44	26	38	17	3	61	2	4	13	1	4	8	51	5	30	6	11	15	6	2	94	4	21	2	...
	February	16	37	29	32	21	6	48	9	5	13	2	6	4	42	1	25	6	21	8	5	1	83	5	18	2	1
	March	18	38	22	50	16	6	86	6	3	11	5	6	7	40	2	25	3	10	19	8	4	103	7	13	1	1
	April	27	33	23	40	15	5	77	5	4	11	2	3	10	41	19	25	8	11	18	9	3	104	5	15	2	...
	May	18	28	22	30	17	9	65	2	2	12	3	1	4	52	12	31	10	17	18	4	6	100	4	24	...	1
	June	17	38	14	20	23	26	58	1	5	11	...	5	4	43	4	20	5	19	12	5	1	50	2	19	..	5
	July	38	27	27	9	15	202	53	3	25	12	9	11	10	35	1	27	6	6	23	8	...	28	...	15	3	...
	August	16	32	28	12	12	201	52	2	23	6	7	13	15	47	2	25	8	1	19	7	...	10	3	12	...	2
	September	15	31	19	13	21	99	65	1	23	10	7	5	8	40	1	16	4	1	16	5	1	22	3	24	...	4
	October	19	42	16	18	16	33	48	3	17	21	5	8	17	46	1	23	7	2	5	10	1	44	2	11	1	2
	November	26	26	16	24	17	7	54	10	3	20	1	2	13	50	1	25	4	1	17	1	1	40	2	6	3	3
	December	23	31	15	29	15	6	55	6	3	17	...	4	15	48	36	30	5	...	13	6	2	98	3	15	3	4

TABLE LX.—Continued.

		Accidents and Negligence.	Apoplexy and Paralysis.	Brain Diseases.	Bronchitis.	Cancer.	Cholera Infantum.	Consumption.	Croup.	Diarrhœa.	Diphtheria.	Dysentery.	Enteritis.	Fever, Typhoid.	Heart Diseases.	Influenza.	Kidney Diseases.	Liver Diseases.	Measles.	Old Age.	Peritonitis.	Pleurisy.	Pneumonia.	Rheumatism.	Scarlatina.	Stomach Diseases.	Whooping Cough.
AGES.	Under 5 years	61	7	138	158	1	603	32	42	79	100	18	34	...	22	15	9	5	86	...	4	2	176	1	106	2	21
	5 to 10	10	2	29	7	...	...	5	6	3	45	4	5	6	14	1	3	2	10	...	5	..	25	2	59	...	2
	10 to 15	11	1	9	...	...	...	10	1	...	8	...	...	7	7	1	3	...	2	...	2	1	8	4	16	1	...
	15 to 20	18	3	7	2	...	...	72	...	2	2	1	...	16	12	2	7	1	1	...	8	2	17	3	3	...	...
	20 to 30	33	6	17	8	3	...	222	1	2	2	1	3	43	27	6	29	6	1	...	15	1	49	5	5	...	...
	30 to 40	42	19	8	8	16	...	172	...	3	...	1	2	15	48	1	34	10	...	...	13	4	68	11	4	3	...
	40 to 50	33	45	11	16	42	..	104	...	3	...	1	5	10	68	7	36	11	...	..	14	6	96	2	...	3	...
	50 to 60	19	62	14	28	43	...	62	...	2	...	1	3	10	81	4	60	15	...	...	7	2	115	4	...	...	...
	69 to 70	20	110	8	39	50	...	16	...	11	...	9	6	6	116	13	63	13	...	12	3	2	102	6	...	4	...
	70 to 80	9	108	12	35	40	...	21	...	6	...	4	7	2	97	16	49	7	...	42	3	...	70	1	...	4	...
	80 and over	5	43	4	13	10	...	5	...	5	..	2	3	...	42	18	7	2	...	129	...	1	50	1	...	...	...
	Not stated	3	1	...	1	...	...	1	...	1	...	...	...	...	1	1	2	...	...	..	..	1	...	..	...	...	...
LOCALITIES.	Bristol County	9	21	12	4	6	11	18	4	3	1	2	...	4	20	7	19	4	...	8	3	2	18	5	1	...	1
	Kent County	21	28	17	9	15	82	55	11	12	11	2	2	7	43	3	15	8	11	16	6	...	42	...	23	2	...
	Newport County Towns	8	7	2	1	4	8	6	...	3	4	1	2	2	10	2	5	2	...	6	3	...	20	1	1	...	1
	Newport City	13	19	21	20	13	36	29	3	3	9	...	1	3	20	3	20	4	..	13	3	2	29	5	2	..	3
	Providence County Towns	51	96	65	76	34	161	162	18	20	30	6	12	21	120	17	49	10	13	46	9	5	160	10	49	5	5
	Pawtucket	13	24	14	51	14	45	40	2	18	33	3	2	13	39	13	21	3	7	39	9	4	41	6	14	2	2
	Providence City	126	171	98	126	92	183	328	7	45	65	21	43	52	238	32	147	36	64	33	30	9	392	9	97	7	7
	Woonsocket	11	18	21	23	8	61	57	5	10	4	3	4	6	15	3	11	2	2	7	7	...	31	3	5	..	2
	Washington County	12	23	7	5	19	16	27	..	3	...	4	2	7	30	5	15	3	3	15	4	...	43	1	1	1	2

DEATHS FROM ACCIDENTS.

The number of deaths from accidental causes of all kinds, reported in Rhode Island, in 1893, was 264. This number is 45 less than during 1892.

Among the 264 deaths from accident there were 14 from asphyxia; 26 from burns and scalds; 47 from drowning; 25 from falls; 25 from fractures and contusions of various kinds; 14 from poison; 39 from accidents of various forms on railroads; and 74 from numerous other accidental circumstances.

Of the whole number of deaths by accident 195 were males and 69 were females; 88 were of native, and 176 were of foreign parentage.

Of the sexes the proportion was 73.86 per cent. of male decedents to 26.13 per cent. of female decedents.

Of parentage, 67 per cent. was of foreign, and 33 per cent. of native.

The number of deaths in each division of the year was as follows:

First Quarter	65	Third Quarter	69
Second Quarter	62	Fourth Quarter	68
First half	127	Second half	137
Whole Year	264		

In regard to periods of life, the decedents from accidental causes were divided as follows: Under 5 years, 61; 5 and under 10, 10; between 10 and 20, 29; between 20 and 40, 75; between 40 and 60, 52; over 60, 34; and 3, age not stated.

In regard to sectional divisions of the State, 9 of the deaths from accidental causes were in Bristol county; 21 in Kent county; 21 in Newport county; 12 in Washington county, and 201 in Providence county.

The whole number of deaths from accidental causes, in 1893, *in proportion to the whole number of deaths* in the State, was about 35 in every one thousand. The number in proportion to the whole *population* was .69 in every one thousand.

Of the 74 various accidents, there was one caused by being run over by electric car, one from electric light current. Of the deaths by asphyxia, one was from caving in of bank, four by smoke, two were infants being overlaid in bed. Of deaths from poisoning, three were from overdose of medicine, one being "Arnold's Balsam," and another "Russell's White Drops."

In the following Table may be found the number, sex, parentage and locality of mortality from accidents, for twenty-nine years, ending December 31, 1893:

Table LXI.

Mortality in the State from Accidents, with the Percentage of the Whole Number of Deaths; Sex, Parentage, and Locality, for twenty-nine years, from 1865 to 1893, inclusive, in three periods of five years each, and for each of the last fourteen years.

YEARS.	Whole Number.	VARIETIES.								Per cent.	SEX.		PARENTAGE.		STATE DIVISIONS.					
		Burns and Scalds.	Drowning.	Falls.	Fractures and Contusions.	Poisoning.	Railroad.	Suffocation.	Various and Unspecified.		Males.	Females.	Native.	Foreign.	Bristol County.	Kent County.	Newport County.	Providence County.*	Providence City.	Washington County.
5 years, 1865-1869	515	81	114	70	...	14	32	1	203	3.31	397	118	245	270	26	36	52	192	166	43
5 years, 1870-1874	612	73	159	89	...	17	68	10	196	3.16	493	119	284	328	22	45	49	219	233	44
5 years, 1875-1879	658	71	168	75	...	31	52	19	242	3.02	487	171	283	375	20	45	50	192	303	48
1880	146	21	33	14	...	5	18	...	55	3.02	108	38	57	89	5	17	10	39	71	4
1881	155	16	29	19	...	9	20	19	43	3.09	107	48	62	93	5	17	12	60	56	5
1882	178	17	40	31	...	6	16	8	60	3.50	130	48	72	106	5	9	15	60	80	9
1883	153	18	27	21	...	6	16	12	53	2.83	117	36	61	92	4	8	9	63	66	3
1884	197	20	41	31	...	7	16	11	71	3.82	147	50	90	107	5	19	14	65	76	18
5 years, 1880-1884	829	92	170	116	...	33	86	50	282	3.26	609	220	342	487	24	70	60	287	349	39
1885	173	19	42	25	...	9	15	9	54	3.20	135	38	72	101	5	6	8	58	83	13
1886	190	23	58	19	...	6	20	9	55	3.25	141	49	84	106	16	11	16	62	72	13
1887	206	17	39	17	23	7	24	14	65	3.24	158	48	92	114	5	11	23	81	71	15
1888	190	27	46	18	8	12	25	8	46	2.87	145	45	63	127	4	6	14	70	88	8
1889	216	20	52	31	25	7	23	9	49	4.10	146	70	88	128	2	14	13	73	101	13
5 years, 1885-1889	975	106	237	110	56	41	107	49	269	3.55	725	250	399	576	32	48	74	344	415	62
1890	250	20	71	32	26	11	31	12	47	3.60	199	51	99	151	7	17	24	75	111	16
1891	233	18	52	21	29	16	30	17	50	3.54	174	59	78	155	5	18	16	95	89	10
1892	309	21	48	33	60	20	29	8	90	4.18	225	84	115	194	8	13	21	100	158	9
1893	264	26	47	25	25	14	39	14	74	3.55	195	69	88	176	9	21	21	75	126	12
Total, 29 yrs	4645	508	1066	571	196	197	474	180	1453	6.83	3504	1141	1933	2712	153	313	367	1579	1950	283

* Exclusive of Providence city.

Table LXII.

Mortality in the State from Alcoholism, with the Percentage of the Whole Number of Deaths, Sex, Parentage and Locality for twenty-nine years, from 1865 to 1893, inclusive.

YEARS.	Number of Deaths from Alcoholism.	Per cent.	SEX.		PARENTAGE.		STATE DIVISIONS.					
			Males.	Females.	Native.	Foreign.	Bristol County.	Kent County.	Newport County.	Providence County.*	Providence City.	Washington County.
5 years, 1865–1869..	55	.38	48	7	27	28	1	4	5	12	29	4
5 years, 1870–1874..	93	.51	74	19	40	53	4	7	9	33	37	3
5 years, 1875–1879..	81	.39	56	25	27	54	2	4	7	17	48	3
1880..............	15	.32	9	6	5	10	1	....	1	4	8	1
1881..............	24	.51	17	7	5	19	1	.....	1	7	14	1
1882..............	28	.58	16	12	8	20	.....	....	.....	9	18	1
1883..............	29	.54	17	12	7	22	....	1	1	10	16	1
1884..............	27	.53	19	8	10	17	.....	1	4	9	12	1
1880–1884.........	123	.50	78	45	35	88	2	2	7	39	68	5
1885..............	22	.41	16	6	6	16	2	1	.....	11	7	1
1886..............	12	.20	9	3	2	10	1	....	1	3	7	.....
1887..............	16	.25	14	2	4	12	2	2	2	5	4	1
1888..............	16	.32	10	6	5	11	.....	.....	2	5	9	.....
1889..............	31	.50	23	8	12	19	2	1	1	13	14	.....
1885–1889.........	97	.34	72	25	29	68	7	4	6	37	41	2
1890..............	25	.37	20	5	8	17	2	.....	.....	11	11	1
1891..............	29	.47	22	7	8	21	1	1	4	10	13	.....
1892..............	36	.48	27	9	8	28	1	.....	4	12	17	2
1893..............	44	.59	34	10	15	29	....	3	7	9	23	2
Total, 29 years ...	583	.43	431	152	197	386	20	25	49	180	287	22

* Exclusive of Providence city.

APOPLEXY AND PARALYSIS.

There were 407 deaths from apoplexy and paralysis in Rhode Island, in 1893, according to the returns. The number reported is 45 more than in the year 1892.

The whole number of deaths from these two causes represents 5.47 per cent. of *all causes*, and a proportion of 1.07 to every one thousand of the population.

Of the sexes, there were 206 males and 201 females.

Of parentage, 227 were of native parentage, and 180 of foreign.

As observed in previous reports, the older native population has steadily been, in a very large proportion, more prone to apoplexy than the foreign, or the children of the foreign population.

It will be observed that the proportion of deaths from apoplexy and paralysis, to the whole mortality from all causes, has steadily increased from about three and one-half per cent., during the first quinquennial (1865–1869), to nearly five and one-half per cent. during the quinquennial 1885–1889.

The following Table will present the sex, parental and local relations of apoplexy and paralysis, as causes of death, during the last twenty-nine years: (Providence city not included in the Providence county statement.)

Table LXIII.

Mortality in the State from Apoplexy and Paralysis, 1865 to 1893, inclusive.

YEARS.	Total Deaths for Year.	Number from Apoplexy and Paralysis.	Per cent.	SEX.		PARENTAGE.		DIVISIONS OF THE STATE.					
				Males.	Females.	Native.	Foreign.	Bristol County.	Kent County.	Newport County.	Providence County.	Providence City.	Washington County.
1865-1869.	15,558	514	3.48	268	276	440	104	47	51	81	129	210	36
1870......	3,238	130	4.32	68	62	105	25	14	10	10	39	52	5
1871......	3,344	156	4.66	73	83	113	43	10	17	15	49	61	13
1872......	4,247	125	2.97	62	63	96	29	17	9	10	27	52	10
1873......	4,403	134	3.04	59	75	109	25	9	8	17	26	57	17
1874......	4,229	156	3.69	84	72	120	36	14	10	16	42	59	15
1870-1874.	19,461	701	3.60	346	355	543	148	64	54	68	174	281	60
1875......	4,317	166	3.61	79	87	133	33	7	13	17	46	75	
1876......	4,116	165	4.01	79	86	130	35	13	11	13	45	68	15
1877......	4,450	181	4.07	87	94	123	58	10	10	16	52	74	19
1878......	4,441	188	4.23	104	84	145	43	12	16	21	58	66	15
1879......	4,172	220	4.92	114	106	146	74	12	9	29	71	89	10
1875-1879.	21,796	920	4.22	463	457	677	243	54	59	96	272	372	67
1880......	4,829	215	4.67	109	106	157	58	18	13	22	71	78	13
1881......	5,016	244	4.86	116	128	170	74	17	15	25	70	101	16
1882......	5,074	265	5.22	139	126	168	97	15	29	24	65	117	15
1883......	5,282	275	5.22	138	137	192	83	11	28	22	75	118	21
1884......	5,141	298	5.80	135	163	176	122	21	14	28	108	105	22
1880-1884.	25,342	1,297	5.12	637	660	863	431	82	99	121	389	519	87
1885......	5,389	289	5.38	144	145	183	106	16	18	28	99	110	18
1886......	5,849	333	5.70	173	160	230	103	11	27	32	108	120	35
1887......	6,340	328	5.17	161	167	213	115	51	27	23	101	128	28
1888......	6,594	367	5.41	164	203	234	133	29	26	29	113	137	33
1889......	6,259	323	5.17	140	183	204	119	23	32	28	101	106	33
1885-1889.	30,431	1,640	5.39	782	858	1,064	576	100	130	140	522	601	147
1890......	6,934	341	4.91	168	173	206	135	21	21	23	110	144	22
1891......	6,620	335	5.08	160	175	207	128	17	29	32	118	118	21
1892......	7,396	362	4.89	176	186	195	167	12	29	39	124	134	24
1893......	7,440	407	5.47	206	201	227	180	21	28	26	138	171	23

Table LXIV.

Ages of Decedents from Apoplexy and Paralysis, in each of the last twenty-nine years.

APOPLEXY AND PARALYSIS.	Periods of Life. Under 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70	70 to 80.	80 and over.	Not stated.
1865	.....	3	5	6	19	20	28	19	.....
1866	1	1	7	16	9	24	27	7	.....
1867	2	.....	6	6	15	38	40	17	.....
1868	2	3	3	11	16	27	31	16	2
1869	1	1	5	12	20	28	34	15	1
1870	4	1	10	9	12	33	41	20	.....
1871	3	4	7	14	21	46	45	15	1
1872	1	4	5	17	20	26	41	11	.....
1873	2	3	4	14	22	35	37	16	1
1874	1	2	9	9	30	39	40	25	1
1875	6	2	8	19	23	40	45	22	1
1876	4	4	4	13	25	43	49	23	.....
1877	1	2	9	12	24	50	61	22	.....
1878	4	2	7	14	41	40	53	26	1
1879	4	6	11	18	27	57	59	38	.....
1880	1	2	8	18	21	59	70	34	2
1881	1	7	11	20	36	55	70	42	2
1882	4	5	14	28	41	57	77	38	1
1883	8	4	11	19	45	56	83	49	.....
1884	10	7	16	21	32	68	95	45	4
1885	8	5	7	25	29	76	94	44	1
1886	7	8	10	25	52	65	112	51	3
1887	12	6	13	26	50	90	96	35	.....
1888	10	4	18	29	61	85	100	60	.....
1889	6	6	11	36	45	87	92	39	1
1890	7	5	13	29	52	84	100	50	1
1891	4	6	15	24	61	88	90	47	.....
1892	3	6	17	40	60	91	95	49	1
1893	13	6	19	45	62	110	108	43	1
Total	130	115	283	575	971	1,617	1,913	918	25

BRAIN DISEASES.

The number of decedents from diseases of the brain proper, for 1893, was 257.

This number represents 3.46 per cent. of *all causes*, and a proportion of .66 to every one thousand of the whole *population*.

Of the 257 decedents, 139 were males, and 118 were females.

In regard to parentage, 116 were of native, and 141 of foreign parentage.

The deaths in the different seasons of the year were as follows:

First Quarter	77	Third Quarter	74
Second Quarter	59	Fourth Quarter	47
First half	136	Last half	121
Whole Year	264		

Brain diseases occur largely in children. Of the 257 decedents from those causes, in 1893, 138 and more than one-half were under five years of age, and 29 were from five to ten years of age.

The following Table will present the statistics of mortality from diseases of the brain, for twenty-nine years:

Table LXV.

Mortality in the State from Brain Diseases, with the Percentage Sex, Parentage, and Locality for twenty-nine years, from 1865 to 1893, inclusive.

YEARS.	Number of Deaths from Brain Diseases.	Per cent.	SEX.		PARENTAGE.		DIVISIONS OF THE STATE.					
			Males.	Females.	Native.	Foreign.	Bristol County.	Kent County.	Newport County.	Providence County.*	Providence City.	Washington County.
1865-1869	444	2.85	243	201	281	163	17	23	37	128	209	30
1870-1874	584	2.99	317	267	335	249	13	31	44	168	314	14
1875	118	2.73	63	55	69	49	3	6	5	30	65	9
1876	150	3.64	92	58	89	61	3	11	7	39	85	5
1877	160	3.59	88	72	91	69	3	7	11	49	85	5
1878	142	3.19	75	67	76	66	1	13	12	45	68	3
1879	163	3.65	82	81	88	75	3	13	15	51	75	6
1875-1879	733	3.36	400	333	413	320	13	50	50	214	378	28
1880	164	3.39	87	77	89	75	3	6	12	56	81	6
1881	186	3.69	103	83	85	101	7	11	14	58	91	5
1882	181	3.50	93	88	92	89	4	10	10	71	80	6
1883	187	3.54	96	91	100	87	8	14	15	52	94	4
1884	148	2.88	90	58	77	71	4	9	8	41	83	3
1880-1884	866	3.40	469	397	443	423	26	50	59	278	429	24
1885	189	3.51	98	91	94	95	2	11	20	53	100	3
1886	182	3.09	108	74	84	98	4	14	13	69	78	4
1887	203	3.21	120	83	103	100	8	9	14	75	95	2
1888	212	3.21	114	98	109	103	4	19	12	76	90	11
1889	189	3.58	91	98	96	93	5	12	17	72	78	5
1885-1889	975	3.30	531	444	486	489	23	65	76	345	441	25
1890	217	3.13	113	104	119	98	7	13	17	90	85	5
1891	222	3.36	135	87	108	114	8	19	19	93	78	5
1892	246	3.33	130	116	122	124	8	22	27	96	83	10
1893	257	3.46	139	118	116	141	12	17	23	100	98	7
Total, 29 years.	4,544	3.59	2,477	2,067	2,423	2,121	127	290	352	1,512	2,115	148

* Providence city not included.

BRONCHITIS.

The number of decedents, in 1893, whose deaths were reported as having been caused by bronchitis, was 315. This is a larger number than was ever returned in a single year, and is 69 more than in 1892.

This number represents 4.24 per cent. of *all causes*, and a proportion of .83 to every one thousand of the *population*.

Of the 315 decedents, 164 were males, and 151 were females; or at the rate of 100 males to each 92 females.

In relation to parentage, 105 were of native, and 210 of foreign parentage.

In regard to age, 158 of the decedents were under 5 years of age, 9 were between 5 and 20 years, 16 between 20 and 40 years, 44 between 40 and 60 years, and of the remaining 88 decedents above 60 years of age, there were 28 deaths from chronic bronchitis.

During the first four months of the year the decedents from bronchitis numbered 160; during the last four months the number was 84.

The very large increase in the proportionate mortality from bronchitis, during the last twenty years, will scarcely fail to be noticed in Table LXVI.

The following Table will show various facts in relation to the mortality from bronchitis, for twenty-nine years:

Table LXVI.

Mortality in the State from Bronchitis, twenty-nine years, 1865 to 1893, inclusive.

YEARS.	Number of Deaths.	Per cent.	SEX.		PARENTAGE.		DIVISIONS OF THE STATE.					
			Males.	Females.	Native.	Foreign.	Bristol County.	Kent County.	Newport County.	Providence County.*	Providence City.	Washington County.
1865–1869	82	.53	32	50	42	40	2	4	9	21	44	2
1870	26	.84	15	11	11	15	.....	.....	1	8	17	.....
1871	24	.78	10	14	11	13	.....	1	1	5	17	.....
1872	25	.65	10	15	11	14	1	1	1	6	16	.....
1873	27	.64	12	15	11	16	.....	.....	1	7	18	1
1874	39	.96	22	17	12	27	.....	.....	.....	6	32	1
1870–1874	141	.72	69	72	56	85	1	2	4	32	100	2
1875	57	1.39	32	25	29	28	.....	.....	1	21	33	2
1876	57	1.46	23	34	26	31	.....	2	.....	7	46	2
1877	69	1.62	32	37	35	34	1	1	1	22	44	.....
1878	80	1.89	30	50	37	43	1	2	6	22	48	1
1879	62	1.47	31	31	31	31	1	1	5	21	34	.....
1875–1879	325	1,49	148	177	158	167	3	6	13	93	205	5
1880	91	1.86	49	42	44	47	1	6	6	21	56	1
1881	84	.67	48	36	39	45	1	1	2	25	53	2
1882	100	1.27	39	61	47	53	3	2	6	25	60	4
1883	111	2.10	56	55	51	60	5	2	3	42	57	2
1884	118	2.29	58	60	40	78	6	.....	8	42	62	.....
1880-1884	504	1.98	250	254	221	283	16	11	25	155	288	9
1885	168	3.08	82	86	91	77	5	3	13	71	76	.....
1886	174	2.96	75	99	81	93	3	4	9	74	83	1
1887	176	2.77	90	86	60	116	3	6	19	63	84	1
1888	228	3.45	105	123	79	149	3	4	17	110	88	6
1889	260	4.20	128	132	90	170	4	8	18	109	110	11
1885–1889	1,006	3.30	480	526	401	605	18	25	76	427	441	19
1890	275	4.01	140	135	116	159	5	4	15	107	138	6
1891	247	3.71	108	139	95	152	13	15	21	85	111	2
1892	308	4.16	147	161	117	191	5	15	21	130	130	7
1893	315	4.24	164	151	105	210	4	9	21	150	126	5

* Not including Providence city.

CANCER.

There were 205 decedents, in 1893, whose deaths were caused by cancer, according to the returns. The term cancer includes all the various kinds, and in whatever place located.

This number represents 2.75 per cent. of *all causes*, and a proportion of .54 to every one thousand of the *population*.

The varieties of cancer, as reported, may be found in Tables VII and VIII, on pages 21, 22, 35 and 36. They are classed in Table IX as follows: Cancer in various localities, or cancer (various), 68; cancer of the breast, 27; of the liver, 27; of the stomach, 41; of the uterus, 42.

In 1893 the deaths from cancer, in the several divisions of the year, were as follows:

First Quarter	54	Third Quarter	48
Second Quarter	55	Fourth Quarter	48
First half	109	Last half	96
Whole Year	205		

Sex.—Of the 205 decedents from cancer, 54 were males and 151 were females; or 26 males and 74 females in every 100.

Parentage.—There were 124 of native parentage, and 81 of foreign.

The following Table will show the facts of mortality from cancer, in relation to sex, parentage and locality, for twenty-nine years:

Table LXVII.

Mortality in the State from Cancer, 1865 to 1893, inclusive.

YEARS.	Number of Deaths.	Per cent.	SEX. Males.	SEX. Females.	PARENTAGE. Native.	PARENTAGE. Foreign.	DIVISIONS OF THE STATE. Bristol County.	Kent County.	Newport County.	Providence County.*	Providence City.	Washington County.
5 yrs. 1865-1869.	303	1.95	94	219	248	55	19	28	38	78	121	19
1870...........	80	2.58	27	53	66	14	5	12	8	25	27	3
1871...........	66	2.13	25	41	47	19	......	7	5	25	25	4
1872...........	95	2.46	26	69	66	29	4	7	9	21	50	4
1873...........	106	2.53	45	61	76	30	4	6	12	32	44	8
1874...........	87	2.13	23	64	67	20	4	6	12	24	38	3
1870-1874.......	434	2.23	146	288	322	112	17	38	46	127	184	22
1875..	95	2.31	24	71	62	33	3	6	7	25	49	5
1876...........	106	2.72	27	79	72	34	5	6	8	27	53	7
1877...........	135	3.17	29	106	87	48	3	7	9	37	66	13
1878...........	119	2.82	38	81	79	40	5	11	8	37	48	10
1879...........	125	2.96	39	86	70	55	9	6	9	28	66	7
1875-1879.... ..	580	2.66	157	423	370	210	25	36	41	154	282	42
1880..	125	2.72	45	80	73	52	5	10	12	26	68	4
1881...........	145	2.90	40	105	90	55	8	10	12	42	65	8
1882...........	132	2.75	40	92	82	50	5	15	9	43	52	8
1883......	169	3.20	51	118	105	64	3	17	12	49	86	2
1884...........	156	3.05	39	117	88	68	2	18	21	41	70	4
1880-1884.......	727	2.87	215	512	438	289	23	70	66	201	341	26
1885...........	193	3.59	52	141	114	79	8	9	8	67	88	13
1886...........	162	2.77	42	120	75	87	6	11	9	37	87	12
1887...........	159	2.50	49	110	96	63	8	5	10	49	80	7
1888......... ..	193	2.93	67	126	128	65	9	10	12	57	88	17
1889...........	189	3.03	65	124	104	85	4	10	13	57	82	23
1885-1889.......	896	2.94	275	621	517	379	35	45	52	267	425	72
1890......... ..	165	2.41	56	109	92	73	14	10	13	46	74	5
1891.....	177	2.67	48	129	104	73	8	11	15	46	83	14
1892...........	181	2.45	53	128	103	78	7	16	16	57	75	10
1893	205	2.75	54	151	124	81	6	15	17	56	92	19

* Not including Providence city.

CHILD-BIRTH.

Under the head of "Child-birth" are included, in this connection, puerperal fever, puerperal convulsions, and whatever causes of death that may have occurred as the direct result of child-birth, or parturition.

The number reported in 1893 was 57, 28 of which were from the immediate effects of child-birth, including metritis, hemorrhage, rupture of uterus, &c., 6 from peritonitis, 3 from puerperal convulsions, 7 from puerperal fever, 8 from septicæmia, and 5 from other causes.

Of the whole number, 23 were of native and 34 of foreign parentage.

This number represents .76 per cent. of *all causes*, and a proportion of .07 to every one thousand of the *population.*

The proportion of deaths from child-birth had largely decreased, during the last ten years previous to 1892, but in 1892 there was an increase of over 100 per cent. There were 18 less deaths from child-birth in 1893 than in 1892.

The following Table will present the various relations in regard to the mortality from child-birth, for twenty-nine years, 1865–1893:

Table LXVIII.

Mortality in the State from Child-Birth, with the Percentage of the Whole Number of Deaths, Parentage, and Locality, for twenty-nine years, from 1865 to 1893, inclusive.

YEARS.	Number of Deaths from Child-Birth	Per cent.	PARENTAGE		DIVISIONS OF THE STATE.					
			Native.	Foreign.	Bristol County.	Kent County.	Newport County.	Providence County.*	Providence City.	Washington County.
1865-1869	145	1.00	59	86	7	8	12	58	51	9
1870-1874	230	1.19	104	126	6	15	17	77	96	19
1875	53	1.30	26	27	1	6	1	10	31	4
1876	48	1.24	21	27	3	......	1	18	23	3
1877	46	1.09	18	28	4	3	5	17	17	......
1878	43	1.01	23	20	2	4	3	9	21	4
1879	43	1.02	21	22	1	7	2	6	23	4
1875-1879	233	1.13	109	121	11	20	12	60	115	15
1880	51	1.11	23	28	4	4	3	10	27	3
1881	60	1.28	26	34	1	1	3	22	29	4
1882	50	1.03	18	32	..	5	1	16	27	1
1883	58	1.10	26	32	1	5	9	14	27	2
1884	47	.91	17	30	......	3	3	19	18	4
1880-1884	266	1.09	110	156	6	18	19	81	128	14
1885	47	.87	21	26	.....	3	4	15	24	1
1886	41	.70	17	24	......	4	4	15	17	1
1887	53	.71	15	38	....	5	4	18	26	.....
1888	51	.77	13	38	......	3	......	25	20	3
1889	41	.65	14	27	1	5	2	16	13	4
1885-1889	233	.74	80	153	1	20	14	89	100	9
1890	41	.58	12	29	3	4	4	10	17	3
1891	32	.35	8	24	.....	3	.....	8	19	2
1892	75	1.01	29	46	1	9	3	24	29	9
1893	57	.76	23	34	......	5	4	15	29	4
Total, 29 years	1,312	.99	534	778	35	102	85	422	584	84

* Not including Providence city.

CHOLERA INFANTUM.

The number of deaths from cholera infantum, according to the returns for 1894, was 603.

This number represents 8.10 per cent. of deaths from *all causes*, and a proportion of 1.59 to every one thousand of the *population*.

Of the 603 decedents, 324 were males, and 279 were females.

Of parentage, 186 were of native, and 417 of foreign parentage; or about 224 of foreign to every 100 of native parentage.

The mortality from cholera infantum, during 1893, was about 4.7 per cent. less than during the year 1892.

As may be seen on the following page, the number of decedents from cholera infantum, during the twenty-nine years from 1865 to 1893, inclusive, was 8,776.

The proportion to total mortality, for the period of twenty-nine years, was nearly 7 per cent. For 1889 the proportion was 6.8 per cent.; for 1890, 8.4 per cent.; for 1891, 8.2 per cent.; for 1892, 8.5 per cent.; and for 1893, 8.1 per cent.

There were 110 males to every 100 females among the decedents during the twenty-nine years; and 149 decedents of foreign parentage to every 100 of native, during the same period.

The following Table shows the whole number of reported deaths from cholera infantum; the sex and parentage of the decedents; and the number in each of the larger divisions of the State, in each of the last twenty-nine years: It will be observed that the percentage of deaths from all causes has greatly increased in the last four years.

TABLE LXIX.

Mortality in the State from Cholera Infantum, 1865 to 1893, inclusive.

YEARS.	Number of Deaths.	Per cent.	SEX. Males.	SEX. Females.	PARENTAGE. Native.	PARENTAGE. Foreign.	DIVISIONS OF THE STATE. Bristol County.	Kent County.	Newport County.	Providence County.*	Providence City.	Washington County.
5 yrs, 1865-1869.	677	4.10	360	317	318	359	41	36	47	224	281	48
1870	213	6.13	106	107	95	118	15	15	13	69	93	8
1871	172	4.82	85	87	82	90	14	12	12	59	62	13
1872	391	8.71	195	196	167	224	16	16	21	157	151	30
1873	285	6.19	148	137	165	120	17	14	16	120	99	19
1874	265	5.86	140	125	115	150	4	12	5	84	134	26
1870-1874	1,326	6.43	674	652	624	702	66	69	67	489	539	96
1875	318	6.97	156	162	155	163	20	16	20	108	136	18
1876	250	5.75	131	119	105	145	5	12	29	68	124	12
1877	259	5.52	139	120	96	163	12	13	9	96	122	7
1878	168	3.58	96	72	73	95	7	14	7	64	71	5
1879	161	3.43	88	73	71	90	8	16	21	51	59	6
1875-1879	1,156	3.03	610	546	500	656	52	71	86	387	512	48
1880	247	5.12	123	124	109	138	13	11	10	93	100	20
1881	240	4.54	130	110	102	138	10	22	14	75	102	17
1882	325	6.10	173	152	133	192	20	11	19	132	130	13
1883	242	4.37	124	118	104	138	12	7	22	88	108	5
1884	325	6.00	177	148	139	186	10	12	26	114	144	19
1880-1884	1,379	5.16	727	652	587	792	65	63	91	502	584	74
1885	279	4.92	150	129	128	151	5	23	16	133	86	16
1886	377	6.14	179	198	148	234	4	29	15	194	120	15
1887	355	5.36	200	155	145	210	16	16	35	160	119	9
1888	467	6.78	239	228	184	283	18	35	28	219	149	18
1889	396	6.01	209	187	132	264	18	32	20	199	116	11
1885-1889	1,874	5 87	977	897	732	1,142	61	135	111	905	590	69
1890	582	8.01	282	300	202	380	19	57	33	245	209	19
1891	546	7.92	298	248	170	376	21	68	50	255	137	15
1892	633	8.18	336	297	210	423	18	77	43	281	201	13
1893	603	8.10	324	279	186	417	11	82	44	267	183	16
Total, 29 years.	8,776	5.93	4,588	4,188	3,529	5,247	354	658	575	3,555	3,236	398

* Not including Providence city.

CONSUMPTION.

The decedents from consumption, during 1893, numbered 722. The number is 37 less than in the preceding year.

This number represents 9.72 per cent. of *all causes*, and a proportion of 1.9 to every one thousand of the *population*.

Sex.—Of these 722 decedents 364 were males, and 358 were females; being about 102 female decedents to every 100 male decedents.

For the period of twenty years (1865–1884), there were one hundred and twenty or more females to every 100 male decedents from consumption, and a very considerable excess every year since, excepting 1890, 1891 and 1893.

Parentage.—There were 230 decedents of native parentage, and 492 of foreign; a proportion of 214 of foreign parentage to every 100 of native.

Season.—The largest number of deaths in any one month, 86, occurred in March; the next largest, 77, in April; the smallest number, 48, in February and in October.

The number in each quarter of the year was as follows:

First Quarter	195	Third Quarter	170
Second Quarter	200	Fourth Quarter	157
First half	395	Last half	327
Whole number	722		

There was less uniformity of the number of deaths in each quarter of the year than in the preceding year.

Ages.—During 1893, of the 722 decedents from consumption, 222 were between the ages of 20 and 30; and 172, or nearly one-fourth, were between the ages of 30 and 40.

In order to show more concisely the relation of age to mortality from consumption, during 1893, the following age periods and numbers are presented:

Under 10 years of age	37
Between 10 and 20 years	82
Between 20 and 30 years	222
Between 30 and 40 years	172
Between 40 and 50 years	104
Between 50 and 70 years	78
Over 70 years, and not stated	27
Total	722

The following Table shows the total deaths from all reported *known causes*, with the *number* and *percentage* of deaths from consumption of the same, in each of the large divisions of the State, and in the whole State, *in each of the last seventeen years;* and also the aggregate for a period of thirty years, from 1860 to 1889, inclusive:

CONSUMPTION.

STATISTICS BY COUNTIES.

NUMBER AND PERCENTAGE,

THIRTY-THREE YEARS.

TABLE LXX.—CONSUMPTION.—*Number, Locality and Percentage.*

COUNTIES.	1877.	1878	1879.	1880.	1881.	1882	1883.	1884.	1885	1886.	1887.	1888.	1889	1890.	1891.	1892.	1893.	Total 30 years, 1860-1889.
BRISTOL COUNTY.																		
Total deaths, stated causes.	201	187	141	209	203	183	197	199	185	221	217	251	208	253	239	232	227	5,217
Consumption............	27	23	16	19	25	36	19	21	12	23	20	28	20	31	17	29	18	646
Percentage..............	13.43	12.30	11.35	9.09	12.31	19.68	9.64	10.50	6.48	10.35	9.22	11.15	9.62	11.85	7.11	12.50	7.93	12.19
KENT COUNTY.																		
Total deaths, stated causes.	251	249	277	293	313	288	283	268	355	385	343	408	454	470	500	598	572	8,151
Consumption............	42	41	38	45	36	51	39	37	45	43	34	55	45	38	47	51	55	1,300
Percentage..............	16.73	16.47	13.72	15.35	11.20	17.71	13.78	13.43	12 70	11.20	9.91	13.44	9.84	8.08	9.40	8.53	9.62	15.94
NEWPORT COUNTY.																		
Total deaths, stated causes.	243	265	330	324	346	378	401	403	408	433	435	458	440	470	597	590	506	10,043
Consumption............	33	31	45	34	51	46	55	43	47	57	41	32	37	51	51	45	35	1,300
Percentage..............	13.58	11.69	13.64	10.40	14 74	12 17	13.72	10.67	11.52	13.16	9.19	7.00	8.41	10 85	8.54	7 63	6.92	13.04
PROVIDENCE COUNTY.*																		
Total deaths, stated causes.	1,301	1,308	1,233	1,437	1,451	1,509	1,656	1,723	1,918	2,087	2,345	2,465	2,286	2,374	2,344	2,632	2,634	39,262
Consumption............	222	229	197	189	220	224	257	248	273	276	246	273	257	305	236	265	259	6,124
Percentage..............	15 96	17.51	15.98	15 35	15.16	14.82	15 52	14.13	14.20	13 05	10.49	11.07	11.24	12.84	10.00	10.07	9.83	15.59

* Not including Providence city.

Table LXX.—CONSUMPTION.—*Number, Locality and Percentage.*—Continued.

COUNTIES.	1877	1878.	1879.	1880.	1881.	1882.	1883.	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.	Total 30 years, 1860–1889.
Providence City.																		
Total deaths, stated causes.	1,932	1,973	2,017	2,063	2,130	2,230	2,351	2,227	2,157	2,341	2,630	2,644	2,495	2,859	2,615	2,950	3,127	51,462
Consumption	294	305	293	322	344	351	364	344	348	368	323	362	315	394	347	342	328	8,090
Percentage...............	15.22	15.46	14.53	15.60	16.15	15.73	15.48	15.43	16.10	15.65	12.23	13.66	12.55	13.69	13.19	11.59	10.49	15.71
Washington County.																		
Total deaths, stated causes.	240	249	220	270	226	215	208	279	307	331	351	368	337	316	307	366	306	7,405
Consumption	43	47	48	33	30	29	32	46	56	59	46	50	53	33	42	27	27	1,296
Percentage..............	17.91	18.88	21.82	12.22	13.27	13.49	15.40	16.28	17.93	17.52	13.10	13.58	15.68	10.38	13.61	7.38	8.82	17.48
Whole State.																		
Total deaths, stated causes.	4,258	4,231	4,218	4,596	4,669	4,804	5,096	5,099	5,330	5,798	6,321	6,594	6,220	6,891	6,586	7,368	7,372	121,740
Consumption.............	661	676	637	642	706	737	766	739	781	826	710	800	727	852	740	759	722	18,755
Percentage...............	15.52	15.98	15.10	14.01	15.12	15.33	15.03	14.34	14.42	14.12	11.19	12.13	11.61	12.29	11.18	10.30	9.79	15.38

Table LXXI.

Mortality in the State from Consumption, with the Percentage of the Whole Number of Deaths, from all Causes, and the Sex, Parentage and Locality in the Aggregate of Different Periods, 1865–1893.

YEARS.	Total Deaths from Consumption.	Per cent.	SEX.		PARENTAGE.		DIVISIONS OF THE STATE.					
			Males.	Females.	Native.	Foreign.	Bristol County.	Kent County.	Newport County.	Providence County.*	Providence City.	Washington County.
1865–1869	2,690	17.29	1,244	1,446	1,575	1,115	116	226	233	909	1,004	202
1870–1874	2,808	14.43	1,217	1,591	1,507	1,301	99	216	159	924	1,175	170
1875–1879	3,279	15 04	1,436	1,843	1,499	1,780	106	192	195	1,060	1,473	253
1880–1884	3,590	14.16	1,597	1,993	1,399	2,191	120	208	229	1,138	1,725	170
1885	781	14 49	382	399	315	466	12	45	47	273	348	56
1886	826	14.12	382	444	308	518	23	43	57	276	368	59
1887	710	11.19	312	398	266	444	20	34	41	246	323	46
1888	800	12.13	391	409	284	516	28	55	32	273	362	50
1889	727	11.61	356	371	239	488	20	45	37	257	315	53
1885–1889	3,844	12.63	1,823	2,021	1,412	2,432	103	222	214	1,325	1,716	264
1890	852	12.29	422	430	280	572	31	38	51	305	394	33
1891	740	11.18	380	360	248	492	17	47	51	236	347	42
1892	759	10.26	360	396	249	510	29	51	45	265	342	27
1893	722	9.72	364	358	230	492	18	55	35	259	328	27
Total, 29 years	19,284	14.18	8,843	10,441	8,399	10,885	639	1,255	1,212	6,421	8,501	1,253

CONSUMPTION. *Proportion of Deaths to Population.*

The proportion of deaths from consumption to the *population* in the different localities in the State, during the last nine years, may be seen in the following summaries:

* Not including Providence city.

For five years, 1885 to 1889, inclusive.

	Persons, One Death to every.		In every 1,000 of Population.
Bristol County	609	or	1 64
Kent County	513	or	1.93
Newport County	717	or	1.40
Providence County*	412	or	2.43
Providence City	357	or	2.61
Washington County	435	or	2.30
Whole State	400	or	2.51

1890.

	Persons, One Death to every		In every 1,000 of Population.
Bristol County	368	or	2.71
Kent County	764	or	1.42
Newport County	560	or	1.78
Providence County Towns	333	or	3.00
Pawtucket	486	or	2.14
Providence City	335	or	3.00
Woonsocket	285	or	3 50
Washington County	716	or	1.40
Whole State	410	or	2.44

1891.

	Persons, One Death to every		In every 1,000 of Population.
Bristol County	684	or	1.46
Kent County	592	or	1.69
Newport County	572	or	1.74
Providence County Towns	575	or	1.73
Pawtucket	572	or	1.74
Providence City	389	or	2.57
Woonsocket	400	or	2.50
Washington County	583	or	1.71
Whole State	484	or	2.06

* Not including Providence city.

1892.

	Persons, One Death to every		In every 1,000 of Population.
Bristol County	400	or	2.50
Kent County	566	or	1.76
Newport County	652	or	1.53
Providence County Towns	472	or	2.12
Pawtucket	581	or	1.72
Providence City	413	or	2.42
Woonsocket	447	or	2.23
Washington County	895	or	1.12
Whole State	484	or	2.07

1893.

	Persons, One Death to every		In every 1,000 of Population.
Bristol County	638	or	1.57
Kent County	543	or	1.84
Newport County	821	or	1.22
Providence County Towns	501	or	2.00
Pawtucket	762	or	1.31
Providence City	457	or	2.19
Woonsocket	414	or	2.42
Washington County	903	or	1.11
Whole State	526	or	1.90

There was a decrease in the mortality from consumption, in 1893, as compared with the preceding year, not only in numbers, but still greater in proportion to the population.

A small increase was returned in Kent county only.

CROUP.

There were 50 decedents from croup, in 1893, as against 89 in 1892.

Sex.—Of the 50 decedents from croup, in 1893, there were 29 males and 21 females, a proportion of 138 males to each 100 females, which is in accordance with the rule of previous years, in which there has been a preponderance of males.

Parentage.—There were 13 decedents of native parentage, and 37 of foreign parentage. The proportions were in the ratio of 285 of foreign to each 100 of native parentage.

Age.—There were 18 of the decedents under one year of age, 8 of one year and under two, 16 of two years and under five, 6 between five and ten, 1 between ten and fifteen, 1 between twenty and thirty.

Season.—

First Quarter	17	Third Quarter	6
Second Quarter	8	Fourth Quarter	19
	—		—
First half	25	Last half	25
Whole Year	50		

The following Table will exhibit various facts in relation to mortality from croup for twenty-nine years:

Table LXXII.

Mortality in the State from Croup, from 1865 to 1893, inclusive.

YEARS.	Number of Deaths.	Per cent.	SEX.		PARENTAGE.		DIVISIONS OF THE STATE.					
			Males.	Females.	Native.	Foreign.	Bristol County.	Kent County.	Newport County.	Providence County.*	Providence City.	Washington County.
1865-1869.......	268	1.73	127	141	103	165	22	14	20	102	101	9
1870-1874.......	324	1.66	174	150	146	178	12	30	10	125	140	7
1875	96	2.33	53	43	43	53	1	3	4	26	56	6
1876	102	2.61	50	52	42	60	1	6	.....	26	65	4
1877..........	95	2.23	48	47	34	61	4	3	1	47	40	.....
1878..........	93	2.20	45	48	43	50	14	3	7	25	39	5
1879..........	96	2.28	58	38	40	56	3	6	15	25	43	4
1875-1879.......	482	2.21	254	228	202	280	23	21	27	149	243	19
1880	66	1.45	32	34	27	39	3	3	4	20	30	6
1881..........	101	2.16	45	56	38	63	2	6	4	38	49	2
1882	77	1.60	41	36	32	45	1	2	6	33	32	3
1883	71	1.40	32	39	33	38	1	6	4	25	35	.....
1884..........	80	1.55	40	40	32	48	2	11	4	29	34	.....
1880-1884.......	395	1.56	190	205	162	233	9	28	22	145	180	11
1885..........	94	1.74	45	49	42	52	4	8	6	46	28	2
1886..........	90	1.53	45	45	39	51	2	18	12	24	32	2
1887..........	113	1.79	58	55	43	70	9	12	4	43	39	6
1888	79	1.19	43	36	34	45	4	2	7	34	27	5
1889..........	80	1.28	37	43	24	56	3	15	1	27	33	1
1885-1889.......	456	1.50	228	228	182	274	22	55	30	174	159	16
1890..........	83	1.19	53	30	28	55	2	14	2	32	31	2
1891..........	67	1.46	40	27	17	50	1	11	11	27	16	1
1892..........	89	1.20	52	37	44	45	1	10	21	21	33	3
1893	50	.67	29	21	13	37	4	11	3	25	7	.....
Total, 29 years..	2,214	1.56	1,147	1,067	897	1,317	96	194	146	800	910	68

* Not including Providence city.

DIARRHŒA AND DYSENTERY.

There were 159 decedents from diarrhœa and dysentery in 1893.

This number represents 2.14 per cent. of all causes and a proportion of .42 to every 1,000 of the population.

Sex.—Of the 159, 79 were males, and 80 were females, or a nearly equal proportion.

Parentage.—There were, of the 159 decedents, 56 of native parentage, and 103 of foreign parentage, or a proportion of about 184 of foreign parentage to every 100 of native.

Age.—There were 97 of the decedents from diarrhœa and dysentery under 5 years of age, and there were 40 over 50 years of age, leaving 22 for all the 45 years between 5 and 50.

Locality.—Of the 159 decedents, 126 were in Providence county, and 7 in Newport county. Fourteen were reported from Kent county, 7 from Washington county, and 5 from Bristol county.

Season.—There were 94 of the deaths from diarrhœa and dysentery that occurred during the months of July, August and September.

The decrease in mortality from diarrhœa and dysentery, in 1893, compared with the previous year, was 20.1 per cent.

The following Table will show the deaths from diarrhœa and dysentery, with the percentage, sex, parentage, etc., for each of twenty-nine years, beginning with 1865 :

Table LXXIII.

Mortality in the State from Diarrhœa and Dysentery, 1865 to 1893, inclusive.

YEARS.	Total Deaths.	Per cent.	Sex: Males.	Sex: Females.	Parentage: Native.	Parentage: Foreign.	Divisions of the State: Bristol County.	Kent County.	Newport County.	Providence County.*	Providence City.	Washington County.
5 yrs, 1865–1869.	839	5.39	429	410	410	429	35	63	103	264	312	62
1870–1874.......	576	2.96	317	259	291	285	18	47	34	187	276	14
1875	106	2.46	60	46	60	46	9	6	1	34	51	5
1876	122	2.96	66	56	52	70	3	6	2	41	65	5
1877	142	3.19	64	78	73	69	8	6	9	54	55	10
1878	93	2.09	42	51	51	42	5	8	2	34	39	5
1879.	97	2.17	48	49	47	50	9	6	10	27	42	3
1875–1879.......	560	2.57	280	280	283	277	34	32	24	190	252	28
1880	98	2.03	49	49	50	48	4	6	10	32	42	4
1881.......	119	2.37	56	63	54	65	2	4	3	47	57	6
1882......... ..	158	3.11	75	83	69	89	2	4	28	57	64	3
1883............	182	3.45	86	96	88	94	7	7	16	74	75	3
1884............	153	2.98	74	79	69	84	10	5	11	66	56	5
1880–1884.......	710	2.80	340	370	330	380	25	26	68	276	294	21
1885............	120	2.23	61	59	51	69	7	6	6	62	35	4
1886	159	2.72	64	95	70	89	7	11	1	73	59	8
1887............	199	3.11	107	92	70	129	6	16	4	92	72	9
1888............	157	2.31	69	88	97	60	6	8	3	54	71	15
1889............	159	2.54	73	86	67	92	1	12	17	71	50	8
1885–1889.	794	2.61	374	420	355	439	27	53	31	352	287	44
1890......... ...	182	2.62	84	98	74	108	5	9	22	77	63	6
1891............	143	2.16	69	74	51	92	4	15	13	48	58	5
1892............	199	2.69	100	99	82	117	6	14	8	76	89	6
1893	159	2.14	79	80	56	103	5	14	7	60	66	7
Total, 29 years.	4,162	3.06	2,072	2,090	1,932	2,230	159	273	310	1,530	1,697	193

* Not including Providence city.

DIPHTHERIA.

The number of deaths from diphtheria, in 1893, was 157, which was 68 more than in 1892, or an increase of over 76 per cent.

This number represents 2.11 per cent. of *all causes* or a proportion of .41 to every one thousand of the *population.*

Sex.—Of the 157 decedents, 75 were males, and 82 were females. As a rule there is a considerable preponderance of females.

Parentage.—There were 57 of native, and 100 of foreign parentage, a nearly equal proportion.

Season.—There were 37 deaths from diphtheria in the first quarter, 34 in the second quarter, 28 in the third quarter, and 58 in the fourth quarter.

Age.—There were 100 deaths under five years of age, 45 between five and ten, 8 between ten and fifteen, 2 between fifteen and twenty, and 2 above twenty years of age.

Locality.—Of the 157 decedents, 132 were in Providence county; 11 in Kent county; 1 in Bristol county; 13 in Newport county; and none in Washington county.

The following Table shows the mortality in the State from diphtheria for twenty-nine years, beginning with 1865, also the percentage of deaths, the sex, parentage, etc. :

Table LXXIV.

Mortality in the State from Diphtheria—1865–1893.

YEARS	Whole Number of Deaths, all Causes.	Number of Deaths, Diphtheria.	Per cent.	SEX.		PARENTAGE.		DIVISIONS OF THE STATE.					
				Males.	Females.	Native.	Foreign.	Bristol County.	Kent County.	Newport County.	Providence County.*	Providence City.	Washington County.
1865–'69	15,558	230	1.48	107	123	147	83	13	30	33	55	50	49
1870–'74	19,461	242	1.24	118	124	154	88	3	40	20	50	101	28
1875....	4,317	33	.80	17	16	18	15	1	4	3	8	14	3
1876....	4,116	159	3.86	77	82	69	90	1	2	9	29	111	7
1877 ...	4,450	492	11.56	239	253	233	259	12	44	2	122	295	17
1878....	4,441	435	9 80	224	211	201	234	21	29	23	106	245	11
1879....	4,472	259	5.79	121	138	143	116	7	19	20	95	106	12
1875–'79	21,796	1,378	6.33	678	700	664	714	42	98	57	360	771	50
1880....	4,829	152	3.40	73	79	75	77	3	6	2	63	61	17
1881....	5,016	216	4.63	106	110	118	98	10	16	8	53	116	13
1882....	5,074	101	1.99	48	53	55	46	......	3	4	29	48	17
1883 ...	5,282	95	1.88	39	56	45	50	1	7	3	26	54	4
1884....	5,141	119	2.31	65	54	47	72	8	1	9	39	58	4
1880–'84	25,342	683	2.66	331	352	340	343	22	33	26	210	337	55
1885....	5,389	99	1.83	47	52	48	51	5	5	6	71	37	7
1886....	5,819	228	3.90	98	130	101	127	20	21	23	64	98	2
1887 ...	6,340	287	4.53	135	152	101	186	15	11	4	114	108	35
1888....	6,594	191	2.86	87	104	79	112	13	3	9	58	98	10
1889....	6,259	184	2.93	80	104	89	95	3	10	11	56	97	7
1885–'89	30,431	987	3.25	447	542	418	571	56	50	53	331	438	61
1890....	6,934	211	3.04	112	99	93	118	1	9	16	86	94	5
1891....	6,620	102	1.50	52	50	48	51	2	7	6	40	47	......
1892....	7,396	89	1.20	48	41	44	45	1	1	8	23	39	17
1893....	7,440	157	2.11	75	82	57	100	1	11	13	67	65	......
Total, 29 yrs.	140,978	4,081	2.89	1,968	2,113	1,965	2,116	141	279	232	1,222	1,942	265

* Not including Providence city.

FEVER, MALARIAL.

The number of deaths, during 1893, from diseases classed as fever malarial, was 20. The number in 1892 was 36; in 1891 was 31; in 1890, 42; in 1889, 40; in 1888, 71; in 1887, 85; in 1886, 43; in 1885, 30; in 1884, 25.

Sex.—Of the 20 decedents from malarial fevers, in 1893, 8 were males and 12 were females, or 67 males to every 100 females.

Parentage.—There were, of the 20 decedents from malarial diseases, 7 of native parentage, and 13 of foreign, or 186 of foreign parentage to every 100 of native.

Season.—The deaths from malarial diseases occurred in the different seasons of the year as follows:

First Quarter	3	Third Quarter	5
Second Quarter	5	Fourth Quarter	7
First half	8	Last half	12
Whole Year	20		

Age.—The number of decedents in the different periods of life was as follows:

Under 5 years of age	5
From 5 to 20 years of age	3
From 20 to 40 years of age	5
From 40 to 60 years of age	4
60 and over	3
	20

Localities.—Bristol county, 0; Kent county, 1; Newport county, 1; Providence county, 17; Washington county, 1.

FEVERS, TYPHOID, ETC.

The number of decedents whose deaths were returned as having been caused by "fever" of some form, not malarial nor cerebro-spinal, was 119. Deaths from puerperal fever are not included.

The term "fever" includes the several types of febrile diseases, as may be seen in Table VII, on page 24: "fevers unspecified," 1; "gastric," 3; "typhoid," 115.

The following Table exhibits, for each of the last twenty-nine years, the number and the percentage, and the sex and parentage of the decedents from fevers returned as from typhoid, and the number in each division of the State:

Table LXXV.

Mortality in the State from Fevers, Typhoid, etc.—1865 to 1893, inclusive.

YEARS.	Number of Deaths.	Per cent.	SEX. Males.	SEX. Females.	PARENTAGE. Native.	PARENTAGE. Foreign.	DIVISIONS OF THE STATE. Bristol County.	Kent County.	Newport County.	Providence County.*	Providence City.	Washington County.
5 yrs, 1865-1869	683	4.4	345	338	451	232	35	44	79	250	211	64
1870-1874	746	3.8	343	403	409	337	16	50	42	271	279	88
1875...........	147	3.4	73	74	90	57	1	4	6	49	69	18
1876	126	3.0	65	61	71	55	5	9	13	44	33	22
1877	134	3.0	63	71	65	69	8	10	8	52	44	12
1878	150	3.4	68	82	77	73	13	13	6	59	47	12
1879...........	114	2.7	47	67	63	51	4	13	6	44	40	7
1875-1879.......	671	3.1	316	355	366	305	31	49	39	248	233	71
1880...........	158	3.4	74	84	94	64	8	12	5	66	52	15
1881	143	2.8	74	69	74	69	4	13	14	58	41	13
1882	229	4.7	111	118	100	129	6	11	5	56	145	6
1883	258	4.8	146	112	117	141	9	16	10	82	134	7
1884	165	3.2	83	82	78	87	7	7	12	66	64	9
1880-1884.......	953	3.7	488	465	463	490	34	59	46	328	436	50
1885...........	158	2.9	71	87	70	88	6	14	8	69	53	8
1886	169	2.9	78	91	76	93	6	8	11	66	70	8
1887...........	127	2.0	67	60	58	69	2	14	9	49	38	15
1888	235	3.6	125	110	88	147	20	24	14	66	102	9
1889	143	2.3	85	58	56	87	2	17	9	46	60	9
1885-1889.......	832	2.7	426	406	348	484	36	77	51	296	323	49
1890...........	107	1.5	58	49	39	68	7	8	5	37	43	7
1891...........	149	2.2	86	63	56	93	5	8	17	46	63	10
1892	133	1.8	75	58	55	78	5	12	9	49	51	7
1893...........	115	1.6	65	50	41	74	4	7	5	40	52	7
Total, 29 years.	4,389	3.1	2,202	2,187	2,228	2,161	173	314	293	1,565	1,691	353

* Not including Providence city.

During 1893, of the 115 decedents from typhoid fever, there were 65 males and 50 females, a proportion of about 130 males to every one hundred females. The difference in the sexes of the mortality from fevers is not usually very great.

During the period of twenty-five years, 1865 to 1889, inclusive, the proportions of the sexes of the decedents from "fever," in the State, were 102 females to every 100 males.

Parentage.—There were 41 decedents from enteric fever, of native parentage, in 1893, and 74 of foreign parentage, a proportion of about 64 of foreign and 36 of native in every 100 decedents.

Season.—

First Quarter	19	Third Quarter	33
Second Quarter	18	Fourth Quarter	45
First half	37	Last half	78
Whole Year	115		

The following Table shows the number of decedents from fevers, *in each division of ages*, in each of the last twenty-nine years, in the State of Rhode Island :

Table LXXVI.

Mortality from Typhoid Fever in Age Periods.

TYPHOID FEVER.	Periods of Life.										
YEARS.	Under 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 and over.	Not stated.
1865	35	18	46	54	30	14	18	7	5	2	....
1866	23	10	21	26	21	16	9	14	10	....	....
1867	17	6	23	33	12	11	8	4	2	2	1
1868	10	7	10	21	8	8	10	5	5	...	....
1869	10	8	14	28	9	7	9	8	6	2	....
1870	16	13	28	39	16	20	7	7	6	1	....
1871	13	10	20	28	18	16	9	4	5	2	....
1872	17	18	34	54	20	9	12	11	3	1	....
1873	27	12	34	31	25	13	13	7	8	2	....
1874	10	14	26	32	9	5	10	3	6	2	....
1875	23	14	19	43	18	10	10	6	4	....	....
1876	21	10	15	24	14	9	6	16	6	3	2
1877	22	13	18	36	20	8	5	7	2	2	1
1878	17	16	27	47	13	11	12	2	3	2	....
1879	19	7	14	26	15	6	3	12	8	9	2
1880	25	12	24	43	23	12	10	5	3	....	1
1881	25	9	19	29	14	11	9	12	11	4	...
1882	24	22	44	69	27	14	9	10	9	1	....
1883	36	25	46	75	31	12	11	10	8	2	2
1884	21	13	19	47	22	9	12	10	5	3	1
1885	35	12	16	25	26	11	11	12	6	4	....
1886	29	9	25	41	20	14	17	8	5	1	....
1887	24	8	16	31	16	10	5	8	4	4	1
1888	27	27	42	75	29	16	12	3	4	....	....
1889	18	12	29	41	18	8	9	5	3	....	....
1890	13	11	13	35	14	5	6	6	4	....	....
1891	12	10	25	50	26	10	7	6	2	....	1
1892	10	11	18	42	20	15	10	6	1	....	....
1893	6	7	16	43	15	10	10	6	2	....	....
Total, 29 years	588	364	701	1168	549	320	279	220	146	43	11

TABLE LXXVII.

Comparative Exhibit of the Percentage of Deaths from Typhoid Fever to Total Deaths from Specified Causes, in Five New England States, for eighteen years, 1876 to 1893.

	1876	1877	1878	1879	1880	1881	1882	1883	1884	1885	1886	1887	1888	1889	1890	1891	1892	1893
Rhode Island.	3.0	3.0	3.4	2.7	3.4	2.8	4.7	4.8	3.2	2.9	2.9	2.0	3.6	2.2	1.5	2.2	1.8	1.6
Massachusetts	2.7	2.7	2.3	1.9	2.5	2.9	2.9	2.3	2.4	2.0	2.1	2.3	2.2	2.2	1.9	1.8	1.7	1.5
Connecticut...	3.6	3.3	2.7	1.8	2.5	2.5	3.1	2.1	2.5	1.1	2.2	1.2	2.2	2.2	2.3	2.3	2.0	....
New Hampshire......	...	....	....	....	....	....	...	...	2.2	2.2	3.0	2.1	2.2	2.4	1.9	2.4	1.3	1.4
Vermont......	4.2	4.8	3.4	2.7	3.5	5.5	3.4	3.1	3.0	2.2	2.5	2.5	2.2	2.7	1.6	1.6	1.1	2.5

DISEASES OF THE HEART.

The number of decedents from the various forms of diseases of the heart, as reported in 1893, was 535. The number is 29 more than that of 1892.

This number represents 7.19 per cent. of *all causes*, and a proportion of 1.40 to every one thousand of the *population*.

Sex.—There were 264 male decedents, and 271 female decedents; a proportion of about 97 males to every 100 females, but these proportions, although varying from year to year, are not greatly different.

Parentage.—Of the 535 decedents from diseases of the heart, in 1893, there were 264 of native parentage, and 271 of foreign, a proportion of about 97 of native parentage to every 100 of foreign. Until 1892 it has been the invariable rule of the whole period of registration that the native population is more subject to heart diseases than the foreign.

The following Table exhibits, for each of the last twenty-nine years 1865 to 1893, inclusive, the number and percentage, and the sex and parentage of the decedents from diseases of the heart, and the number of the same in each division of the State:

Table LXXVIII.

Mortality from Diseases of the Heart, 1865 to 1893, inclusive.

YEARS.	Number of Deaths.	Per cent.	SEX.		PARENTAGE.		DIVISIONS OF THE STATE.					
			Males.	Females.	Native.	Foreign.	Bristol County.	Kent County.	Newport County.	Providence County.*	Providence City.	Washington County.
5 yrs, 1865-1869.	571	3.67	309	262	394	177	24	43	48	176	250	30
1870-1874	853	4.38	451	402	559	294	23	43	68	234	436	49
1875	186	4.31	84	102	113	73	2	13	22	49	88	12
1876	166	4.03	86	80	109	57	9	11	10	38	86	12
1877	182	4.09	94	88	110	72	3	7	9	57	93	13
1878...........	166	3.73	88	78	109	57	5	11	15	38	83	14
1879.....	202	4.78	114	88	127	75	8	20	16	38	111	9
1875-1879.......	902	4.14	466	436	568	334	27	62	72	220	461	60
1880...........	231	5.03	125	106	146	85	9	21	29	59	104	9
1881...........	264	5.65	131	133	154	110	9	21	24	73	121	16
1882...........	255	5.31	116	139	162	93	8	16	23	55	142	11
1883	325	6.20	167	158	179	146	8	27	30	70	172	18
1884	285	5.60	135	150	163	122	6	16	25	87	139	12
1880-1884.......	1,360	5.36	674	686	804	556	40	101	131	344	678	66
1885	349	6.48	162	187	198	151	13	27	25	94	159	31
1886	330	5.20	152	178	184	146	12	20	18	82	168	30
1887...........	406	6.40	205	201	240	166	7	21	36	123	193	26
1888	436	6.56	196	240	240	196	11	22	40	122	210	31
1889	460	7.35	233	227	258	202	19	31	39	143	199	29
1885-1889	1,981	6.51	948	1,033	1,120	861	62	121	158	564	929	147
1890	405	5.81	222	183	219	186	15	49	27	114	172	28
1891...........	480	7.25	248	232	244	236	21	37	38	137	210	37
1892	506	6.81	260	246	252	254	22	47	48	163	200	26
1893....	535	7.19	264	271	264	271	20	43	30	174	238	30
Total, 29 years .	7,593	6.51	3,812	3,751	4,424	3,169	251	516	620	2,126	3,574	473

* Not including Providence city.

Sex.—Of the 7,593 persons deceased from diseases of the heart, in the last twenty-nine years, 3,842 were males, and 3,751 were females; or 102 males to each 100 females.

Parentage.—Of the 7,593 decedents, during twenty-nine years, 4,424 were of native parentage, and 3,169 of foreign. The proportions would, therefore, stand as follows: To every 100 of foreign parentage there were about 140 of native; or about 58 native and 42 of foreign parentage in every 100 deaths. This difference has been gradually diminishing. In 1892 there were two more deaths of foreign than of native parentage, and in 1893 there were seven more deaths of foreign than of native parentage.

Diseases of the heart rank fourth in the order of causes in 1893, and have for the average of the past twenty-nine years.

The following Table shows the number of decedents from diseases of the heart, in each divisional period of life, in each of the last twenty-nine years:

Table LXXIX.

Mortality from Diseases of the Heart, in Age Periods.

APOPLEXY AND PARALYSIS.	Under 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70	70 to 80.	80 and over.	Not stated.
1865	14	4	6	7	22	17	19	9	......
1866	18	8	14	17	10	23	21	4	......
1867	11	11	10	13	22	16	27	4	......
1868	15	5	13	11	14	28	25	5	......
1869	21	4	14	18	20	22	21	7	1
1870	19	6	11	13	20	21	23	3	1
1871	9	12	10	19	23	36	28	6	1
1872	27	12	22	19	31	36	29	13	......
1873	19	11	28	18	25	35	42	9	2
1874	20	16	26	21	27	50	40	12	2
1875	14	16	25	20	32	29	41	9	......
1876	14	10	15	19	20	38	39	10	1
1877	15	11	20	18	27	45	33	13	......
1878	16	8	18	16	26	36	35	11	......
1879	19	9	13	25	33	51	36	16	......
1880	15	10	18	23	38	49	49	28	1
1881	32	13	26	23	37	49	53	21	......
1882	22	17	24	25	36	51	61	17	2
1883	39	13	21	33	52	65	76	26	......
1884	15	25	21	32	45	61	50	32	4
1885	38	13	24	42	61	69	78	24	......
1886	39	18	28	38	52	68	69	18	......
1887	52	30	23	35	61	79	87	39	......
1888	39	25	30	54	84	97	74	33	......
1889	45	25	37	45	69	85	118	35	1
1890	34	15	24	53	69	78	96	36	......
1891	40	18	45	41	85	109	101	38	3
1892	54	21	32	59	93	111	101	31	1
1893	55	27	48	68	81	116	97	42	1
Total, 29 years	770	413	616	835	1,215	1,570	1,572	551	21

The results of twenty-nine years of registration, with record of ages of decedents from diseases of the heart, show in periods of twenty years each of life, the following percentages:

Under 20 years of age	10.1 per cent.
Between 20 and 40	13.9 per cent.
Between 40 and 60	27.0 per cent
Between 60 and 80	41.4 per cent.
Over 80	7.3 per cent
Not stated	.3 per cent.
	100.0 per cent.

It will be seen that more than 41 per cent. of all the deaths from diseases of the heart were of persons over sixty years of age, and under eighty.

Diseases of the heart have acquired large importance as a cause of death. From 30.0 in every 1,000 deaths from all causes, in 1865, heart diseases gradually increased to about 73 in every 1,000, in 1889, and falling back to slightly less than 60 per 1,000 in 1890, and rising to 72.5 per thousand in 1891, and falling to 68.4 in 1892. In 1893 there were 71.9 deaths from heart diseases, in every 1,000.

INFLUENZA.

The event, during the first four months of the year 1890, of a very extraordinary and perhaps unprecedented prevalence of a form of influenza, which was unlike that of ordinary occurrence in that it affected indiscriminately all the functions and nearly all the organs of the body, varying with the individuals attacked, and the reappearance of the same, although in greatly lessened numbers, in 1891, warrants a continued notice not given previous to 1890, in the Registration Reports, to the affection so named.

The disease was, in 1890, most largely confined to the respiratory passages, and resulted in a largely increased mortality from bronchitis and consumption. During 1891 the disease was equally as severe, affecting in a larger measure the brain and other nerve centres, and the direct mortality was even larger than that of 1890. The prevalence was largest during the second quarter of the year, and again in December.

There were 85 deaths reported, in 1893, as resulting from influenza. This was 251 less than in 1892.

The increase in December of 1891 was followed by a sudden augmentation in the first four months of the following year 1892, the greatest number of deaths, 198, occurring in January of 1892. The total for 1892 was 336, or about twice as much as for either of the previous years.

Sex.—Of the 85, 34 were males and 51 were females, a proportion of 67 males to every 100 females.

Parentage.—The parent nativity of the decedents was 47 of native and 38 of foreign.

Season.—Of the 85 deaths from influenza, during 1893, 8 occurred in the first quarter of the year, 35 in the second, 4 in the third, and 38 in the fourth quarter.

Age.—There were 15 under 5 years of age, 4 from 5 to 20 years, 7 from 20 to 40, 11 from 40 to 60, 29 from 60 to 80, 18 from 80 years of age and over, and 1 age not stated.

The following Tables will show the proportionate nativity, sex and location of the disease.

The greatest mortality appears to be among females, there being 143 females to every 100 males. The nativity appears equally divided between native and foreign, there being about 103 foreign to 100 native.

The largest number of deaths occurred in Providence city, but this is not out of proportion to the proportionate number and density of population.

Referring to the age periods, it will be seen that the greatest age is 70 to 80, there being 149, or 19.43 per cent. of the whole number of deaths from this disease. Taking the three decennials including 60 to 90 we have 371 deaths, or 48.43 per cent. of all by ages.

By season, the greatest number of deaths occurred during the winter months, the most severe being during January, December and February. The number in January and February make a total of 398, or 51.96 per cent. of all.

Mortality in the State from Influenza (epidemic), 1890 to 1893, inclusive.

YEARS.	Number of Deaths.	Per cent.	SEX. Males.	SEX. Females.	PARENTAGE. Native.	PARENTAGE. Foreign.	DIVISIONS OF THE STATE. Bristol County.	Kent County.	Newport County.	Providence County.*	Providence City.	Washington County.
1890	168	2.42	72	96	68	100	6	14	12	61	70	5
1891	177	2.67	67	110	91	86	7	14	14	60	69	13
1892	336	4.54	142	194	170	166	11	27	13	115	144	26
1893	85	1.14	34	51	47	38	7	3	5	33	32	5
1890-1893	766	2.69	315	451	376	390	31	58	44	269	315	49

* Not including Providence city.

Influenza by Age Periods, 1890–1893.

YEARS.	Under 1.	1 to 5.	5 to 10.	10 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 to 90.	90 and over.	Not stated.
1890	14	20	4	8	14	22	18	17	19	17	11	5	.....
1891	11	12	......	8	14	6	14	21	29	42	19	1	.....
1892	26	20	2	6	13	19	25	33	74	74	41	3	......
1893	7	5	4	3	6	1	7	4	13	16	16	2	1
1890-1893...	58	57	10	25	47	48	64	75	135	149	87	11	1
Per cent. of all ages ..	7.57	7.41	1.30	3.26	6.13	6.26	8.35	9.79	17.62	19.43	11.35	1.43	.....

Influenza by months, 1890–1893.

YEARS.	Jan.	Feb.	March.	April.	May	June.	July.	Aug	Sept.	Oct.	Nov.	Dec.	Total.
1890	108	27	11	8	4	2	2	....	1	3	1	1	168
1891	4	3	1	22	19	19	2	2	2	4	1	98	177
1892	198	52	31	27	9	6	....	2	3	2	1	5	336
1893	5	1	2	19	12	4	1	2	1	1	1	36	85
1890-1893.	315	83	45	76	44	31	5	6	7	10	4	140	766

INSANITY.

There were 39 deaths from insanity, in 1893, an increase of 12 from 1892. The percentage to the whole number of deaths was a little more than one-half of one per cent. The percentage during the last four years has been less than the average of the twenty-five years preceding. These deaths occurred chiefly at the Cranston institutions, and in the Butler hospital.

Sex.—There were 14 male and 25 female decedents.

Parentage.—The number of native decedents from insanity was 13, and of foreign parentage 26.

The following Table shows the mortality in the State from insanity, for twenty-nine years, with percentage to deaths from all causes, sex, parentage, etc., from 1865 to 1893, inclusive:

Table LXXX.

Mortality in the State from Insanity.

YEARS.	Number of Deaths from Insanity.	Per cent.	SEX. Males.	SEX. Females.	PARENTAGE. Native.	PARENTAGE. Foreign.	DIVISIONS OF THE STATE. Bristol County.	Kent County.	Newport County.	Providence County.*	Providence City.	Washington County.
5 yrs, 1865–1869.	74	.49	36	38	55	19	......	8	3	7	54	2
1870–1874.......	92	.48	43	49	64	28	3	1	5	26	57	......
1875	32	.78	18	14	25	7	......	1	4	9	16	2
1876	12	.28	5	7	9	3	1	2	1	1	6	1
1877...........	19	.49	9	10	9	10	......	1	......	5	12	1
1878	22	.50	5	17	16	6	......	......	1	3	17	1
1879.	17	.40	11	6	10	7	......	......	......	5	11	1
1875–1879......	102	.49	48	54	69	33	1	4	6	23	62	6
1880	19	.39	9	10	13	6	......	1	2	6	9	1
1881	32	.63	15	17	22	10	1	1	3	10	16	1
1882.......... ..	23	.45	9	14	18	5	......	1	.....	8	12	2
1883............	29	.55	12	17	17	12	1	2	......	7	18	1
1884	36	.69	17	19	24	12	2	3	......	21	9	1
1880–1884.......	139	.54	62	77	94	45	4	8	5	52	64	6
1885	35	.67	16	19	18	17	......	......	2	23	10	.....
1886	49	.83	21	28	28	21	3	1	1	37	7	......
1887............	64	1.01	35	29	33	31	1	......	1	56	.....	6
1888	43	.64	21	22	24	19	1	2	.....	33	7	......
1889	22	.35	14	8	12	10	.....	.....	......	14	8	......
1885–1889. . ..	213	.70	107	106	115	98	5	3	4	163	32	6
1890......... ...	30	.44	19	11	16	14	1	1	1	13	14	.....
1891.	21	.32	10	11	16	5	......	1	......	5	13	2
1892...........	27	.37	17	10	15	12	3	1	.....	8	14	1
1893	39	.53	14	25	13	26	......	.....	......	30	9	.....
Total, 29 years	737	.53	356	381	457	280	17	27	21	327	319	23

* Not including Providence city.

DISEASES OF THE KIDNEYS.

There were 302 deaths returned, during 1893, with diseases of the kidneys assigned as the cause.

This number represents 4.06 per cent. of *all causes* or a proportion of about .79 to every one thousand of the *population.*

Sex.—Of the 302 there were 154 males and 148 females.

Parentage.—There were 141 of native parentage and 161 of foreign, or about 88 of native to every 100 of foreign parentage.

In 1890 it occurred for the first time in twenty-six years, that the decedents from diseases of the kidneys, of foreign parentage, outnumbered those of native parentage.

Age.—Of the 302 decedents from kidney diseases 9 were under five years of age, 13 from five to twenty, 63 from twenty to forty, 96 from forty to sixty, 112 from sixty to eighty, 7 eighty and over, and 2 ages not stated.

Diseases of the kidneys have largely increased in number, and much larger still in proportion, during the last twenty-nine years.

During the ten years from 1865 to 1874, inclusive, the proportion of deaths from kidney diseases, to whole number of deaths from all causes, was but little more than one per cent., while during the ten years from 1884 to 1893, inclusive, the proportion was three and eight-tenths per cent.

The following Table will present various facts in relation to the mortality from diseases of the kidneys, in Rhode Island, for twenty-nine years, 1865–1893:

TABLE LXXXI.

Mortality in the State from Kidney Diseases, with the Percentage of the Whole Number of Deaths, Sex, Parentage and Locality, for twenty-nine years, from 1865 to 1893, inclusive.

YEARS.	Number of Deaths from Kidney Diseases.	Per cent.	SEX.		PARENTAGE.		DIVISIONS OF THE STATE.					
			Males.	Females.	Native.	Foreign.	Bristol County.	Kent County.	Newport County.	Providence County.*	Providence City.	Washington County.
5 yrs, 1865-1869.	117	.76	83	34	80	37	6	4	19	23	57	8
1870-1874.......	261	1.34	154	107	162	99	11	14	19	56	144	17
1875	65	1.58	36	29	46	19	1	......	4	16	42	2
1876	50	1.28	22	28	32	18	1	1	7	10	28	3
1877	67	1.57	40	27	35	32	2	1	......	14	49	1
1878.......... ..	80	1.89	50	30	49	31	4	3	3	21	47	2
1879...........	79	1.88	51	28	44	35	1	3	1	23	43	8
1875-1879.......	341	1.56	199	142	206	135	9	8	15	84	209	16
1880	91	2.02	52	39	51	40	1	5	10	27	46	2
1881..	79	1.69	40	39	47	32	7	5	4	14	48	1
1882	86	1.79	50	36	45	41	2	5	10	15	52	2
1883	129	2.43	72	57	74	55	5	2	17	37	60	8
1884........ ...	118	2.29	53	65	66	52	5	11	12	28	54	8
1880-1884.......	503	1.98	267	236	283	220	20	28	53	121	260	21
1885	159	2.97	92	67	86	73	8	10	17	31	88	5
1886............	155	2.49	85	70	93	62	3	10	22	37	71	12
1887............	169	2.66	92	77	90	79	5	6	16	43	92	7
1888	213	3 23	102	111	122	91	10	10	21	46	115	8
1889	210	3.38	119	91	122	88	14	13	15	62	96	10
1885-1889.......	906	2.94	490	416	513	393	40	49	94	219	462	42
1890	229	3.20	116	113	109	120	15	8	21	59	116	10
1891....	245	3.06	123	122	122	123	9	12	25	72	114	13
1892	258	3.49	135	123	127	131	9	11	24	70	128	16
1893	302	4.06	154	148	141	161	19	15	25	81	147	15
Total, 29 years..	3,162	2.07	1,721	1,441	1,743	1,419	138	149	295	785	1,637	158

* Not including Providence city.

DISEASES OF THE LIVER.

There were 72 deaths reported, in 1893, as having been caused by structural diseases of the liver.

This number represents .97 per cent. of *all causes*, and a proportion of .18 to every one thousand of the *population*.

Of the 72 decedents there were 43 males and 29 females, or 67 females to every 100 males.

There were 30 of native parentage and 42 of foreign, or about 71 of native to every 100 of foreign.

Forty-eight, two-thirds of the whole number, were of persons of forty years of age and over.

In the age period of from five to forty, there were but nineteen decedents from diseases of the liver.

The mortality from such diseases does not depend to any marked extent upon the influence of season.

Table LXXXII will present various facts relating to diseases of the liver during 29 years:

Table LXXXII.

Percentage to Whole Number of Deaths, Sex, Parentage and Locality of Decedents from Diseases of the Liver, 1865–1893.

YEARS.	Number of Deaths.	Per cent.	SEX.		PARENTAGE.		DIVISIONS OF THE STATE.					
			Males.	Females.	Native.	Foreign.	Bristol County.	Kent County.	Newport County.	Providence County.*	Providence City.	Washington County.
5 yrs, 1865–1869.	183	1.19	103	80	122	61	14	11	33	42	67	16
1870–1874.......	200	1.03	94	106	117	83	13	16	16	61	74	20
1875	47	1.09	26	21	19	28	5	2	3	10	26	1
1876	45	1.09	26	19	27	18	1	5	5	11	18	5
1877...........	52	1.17	23	29	31	21	1	......	7	16	24	4
1878	49	1.10	25	24	32	17	8	1	6	14	18	2
1879.	52	1.24	27	25	31	21	4	4	2	14	22	6
1875–1879......	245	1.14	127	118	140	105	19	12	23	65	108	18
1880	58	1.27	29	29	40	18	4	3	8	15	25	3
1881.......	46	.92	30	16	21	25	2	2	6	8	24	4
1882.......... ..	62	1.22	34	28	36	26	3	5	10	17	24	3
1883	51	.94	27	24	20	31	5	6	4	16	18	2
1884............	48	.93	22	26	23	25	5	3	5	2	31	2
1880–1884.......	265	.106	142	123	140	125	19	19	33	58	122	14
1885	61	1.13	24	37	32	29	2	6	6	21	24	2
1886	51	.92	29	25	26	28	4	4	4	14	28	......
1887............	86	1.35	40	46	38	48	3	5	3	31	39	5
1888............	68	1.03	38	30	36	32	1	5	6	28	26	2
1889	70	1.12	30	40	31	39	1	2	10	26	29	2
1885–1889. . ..	339	1.11	161	178	163	176	11	22	29	120	146	11
1890......... ...	65	.91	42	23	29	36	3	4	6	21	26	5
1891.	81	1.23	41	40	28	53	3	4	9	26	38	1
1892...........	89	1.20	39	50	31	55	3	5	4	27	45	5
1893	72	.97	43	29	30	42	4	8	6	15	36	3
Total, 29 years.	1,539	1.11	792	747	803	736	89	101	159	435	662	93

* Not including Providence city.

DROPSY.

During 1893 there were 39 deaths returned as having been caused by dropsy.

This number represents .52 per cent. of deaths from *all causes*, and a proportion of .10 to every one thousand of the *population*.

It has been repeatedly observed in previous reports that although this term is a misnomer in a large measure, and conveys no definite idea of the pathological condition preceding the dropsical accumulation, it is, nevertheless, the only cause returned, and as it is in some instances the apparently immediate cause of death, it is given a place in the Registration Reports; and as a frequent result and concomitant of diseases of the kidneys and liver, it has been placed in comparison with them in the following Table.

Of the 39 decedents from dropsy, 11 were males and 28 were females.

The female decedents from dropsy are in nearly every year, in a considerable number, in excess of the male decedents.

Of the parentage, 16 were of native and 23 of foreign parentage.

An examination of Table LXXXIII will serve as evidence of the greater carefulness and better judgment of the medical practitioners of the present time, inasmuch as the causes of dropsy are now better understood and reported, and for that reason the number of deaths attributed to dropsy have diminished nearly fifty per cent.

Table LXXXIII.

Mortality from Kidney and Liver Diseases compared with Dropsy (so returned) for forty-one years—1853–1893.

YEARS.	Deaths from Kidney Diseases			Deaths from Liver Diseases			Total Deaths from Kidney and Liver Diseases.			Deaths from Dropsy.			Excess or Diminution of Dropsy in reference to Kidney and Liver Diseases.	Per cent. of Deaths from Dropsy to all.
	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.		
1853-1857.	26	20	6	51	28	23	77	48	29	208	89	119	+131	2.21
1858-1862.	71	38	33	168	87	81	239	125	114	270	113	157	+31	2.07
1863-1867.	99	69	30	191	104	87	290	173	117	371	169	202	+81	2.10
1868-1872	185	119	66	183	92	91	368	211	157	274	126	148	—94	1.62
1873-1877	314	172	142	229	116	113	543	288	255	284	125	159	—259	1.32
1878	81	51	30	49	25	24	130	76	54	38	21	17	—92	.86
1879	81	52	29	52	27	25	133	79	55	50	26	24	—83	1.12
1880......	91	52	39	58	29	29	149	81	68	37	15	22	—112	.77
1881	79	40	39	46	30	16	125	70	55	47	23	24	—78	.94
1882......	88	47	41	62	34	28	150	81	69	50	22	28	—100	.99
1878-1882.	420	242	178	267	145	122	687	387	300	222	107	115	—465	.94
1883......	117	67	50	51	27	24	168	94	74	47	21	26	—121	.89
1884......	133	58	75	52	24	28	185	82	103	40	20	20	—145	.78
1885......	168	95	73	61	24	37	229	119	110	44	30	14	—185	.82
1886......	163	91	72	71	38	33	234	129	105	49	20	29	—185	.84
1887......	169	92	77	86	40	46	255	132	123	35	14	21	—220	.55
1883-1887.	750	403	347	321	153	168	1,071	556	515	215	105	110	—856	.78
1888......	213	102	111	68	38	30	281	140	141	48	18	30	—233	.73
1889......	210	119	91	70	30	40	280	149	131	42	14	28	—238	.60
1890	229	116	113	65	42	23	294	158	136	46	18	28	—248	.67
1891......	245	123	122	81	41	40	326	164	162	35	8	27	—291	.52
1892......	258	135	123	89	39	50	347	174	173	39	17	22	—308	.53
1888-1892	1,155	595	560	373	190	183	1,528	785	743	210	75	135	—1,318	.61
1893	302	154	148	72	43	29	374	197	177	39	11	28	—335	.52
Totals....	3,322	1,812	1510	1,855	958	897	5,177	2,770	2,407	2,093	920	1,173	—3,081	.63

MEASLES.

There were 100 decedents from measles as a cause of death in 1893. The number is 72 more than in the preceding year, and much larger than any previous year since 1887.

This number represents 1.34 per cent. of *all causes*, and a proportion of .26 to every one thousand of the *population*.

Of the 100, there were 56 males and 44 females. The sexes seem to be nearly equally susceptible to measles and to mortality therefrom.

Of parentage there were 33 of native and 67 of foreign.

During the last ten years the proportion of mortality from measles has been about 63 of native to every 100 of foreign parentage.

During 1893 the number of decedents under five years of age was 86

The number in the different divisions of the State may be found in Table LXXXIV:

Table LXXXIV.

Mortality in the State from Measles—1865 to 1893.

YEARS.	Number of Deaths.	Per cent.	SEX.		PARENTAGE.		DIVISIONS OF THE STATE.					
			Males.	Females.	Native.	Foreign.	Bristol County.	Kent County.	Newport County.	Providence County.*	Providence City.	Washington County.
5 yrs, 1865-1869.	82	.54	38	44	20	62	6	4	12	34	26	.....
1870-1874	126	.65	54	72	63	63	5	13	7	46	51	4
1875	2	.05	1	1	.....	2	.....	.....	.....	2	.....	.....
1876	4	.10	.....	4	1	3	.....	.....	.....	4	.....	.....
1877	11	.25	3	8	2	9	.....	.....	1	8	2	.....
1878...........	81	1.82	39	42	25	56	2	3	.....	26	50	.....
1879.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1875-1879.......	98	.44	43	55	28	70	2	3	1	40	52	.....
1880...........	9	.20	3	6	2	7	.....	.....	.....	6	3	.....
1881...........	37	.74	17	20	15	22	.....	1	2	9	25	.....
1882...........	6	.12	1	5	.....	6	.....	.....	.....	2	4	.....
1883........ ...	14	.27	11	3	9	5	.....	1	.....	3	8	2
1884...........	18	.35	10	8	5	13	1	6	1	3	7	.....
1880-1884.......	84	.33	42	42	31	53	1	8	3	23	47	2
1885...........	45	.84	27	18	19	26	.....	7	2	27	8	1
1886	18	.30	11	7	4	14	.....	5	.....	4	9	.....
1887...........	132	2.08	69	63	57	75	.....	5	8	26	90	3
1888	11	.22	5	6	3	8	.....	2	.....	7	2	.....
1889	29	.47	15	14	10	19	.....	8	.....	7	14	.....
1885-1889... ...	235	.77	127	108	93	142	.....	27	10	71	123	4
1890....	92	1.32	45	47	42	50	2	10	.....	41	31	8
1891...........	12	.18	7	5	4	8	1	2	2	3	3	1
1892	28	.38	14	14	10	18	.....	2	4	11	11	.....
1893........ ..	100	1.34	56	44	33	67	.....	11	.....	22	61	3
Total, 29 years.	857	.59	426	431	324	533	17	80	39	291	408	22

* Not including Providence city.

OLD AGE.

The number of deaths, in 1893, attributed to old age as a cause, was 183.

This number represents 2 44 per cent. of *all causes*, and a proportion of .48 to every one thousand of the *population*.

This is 73 less than in 1892.

Of the 183 decedents from old age, 72 were males and 111 were females, or about 65 males to every 100 females.

Of the parentage of the 183, there were 113 of native and 70 of foreign parentage, or nearly 161 of native to every 100 of foreign.

The following Table will present the statistics of deaths in Rhode Island from old age, for twenty-nine years:

Table LXXXV.

Mortality in the State from Old Age, with the Percentage of the Whole Number of Deaths, Sex, Parentage and Locality, for twenty-nine years, from 1865 to 1893, inclusive.

YEARS.	Number of Deaths.	Per cent.	SEX.		PARENTAGE.		DIVISIONS OF THE STATE.					
			Males.	Females.	Native.	Foreign.	Bristol County.	Kent County.	Newport County.	Providence County.*	Providence City.	Washington County.
1865-1869......	946	6.53	349	597	728	218	49	91	157	262	269	118
1870-1874......	1,146	6.32	451	695	838	308	62	104	152	322	340	166
1875	216	5.25	93	123	150	66	9	23	33	69	59	23
1876	241	6.18	107	134	177	64	12	14	38	65	71	41
1877	213	5.00	96	117	145	68	12	23	29	57	63	29
1878	222	5.25	84	138	172	50	15	8	32	76	61	30
1879	220	5.22	82	138	152	68	14	19	26	69	67	25
1875-1879......	1,112	5.38	462	650	796	316	62	87	158	336	321	148
1880	273	5.95	121	152	186	87	12	20	34	90	73	44
1881	247	5.29	101	146	167	80	12	24	36	93	72	10
1882	283	5.89	110	173	190	93	20	25	40	106	79	13
1883	275	5.22	105	170	184	91	17	18	44	91	84	21
1884	293	5.68	101	192	196	97	16	20	39	106	86	26
1880-1881......	1,371	5.60	538	833	923	448	77	107	193	486	394	114
1885	267	4.95	86	181	183	84	9	32	47	87	70	22
1886	276	4.69	101	175	181	95	16	24	36	100	73	27
1887	278	4.38	103	175	167	111	17	19	29	109	76	28
1888	290	4.35	108	182	198	92	16	26	25	124	64	35
1889	227	3.63	75	152	136	91	10	23	23	73	71	27
1885-1889......	1,338	4.40	473	865	865	473	68	124	160	493	354	139
1890	198	2.87	72	126	123	75	16	19	19	59	63	22
1891	185	2.80	83	102	121	64	18	16	26	65	41	19
1892	256	3.46	95	161	168	88	9	24	29	91	71	32
1893	183	2.44	72	111	113	70	8	16	19	33	92	15
1870	6,735	4.85	2,595	4,140	4,675	2,060	369	588	913	2,147	1,945	773

* Not including Providence city.

PERITONITIS.

There were 74 deaths which were caused by peritonitis, during 1893. This number represents .99 per cent. of *all causes*, and a proportion of .19 to every one thousand of the *population*.

Sex.—Of the 74 decedents from peritonitis there were 31 males and 43 females, a proportion of nearly 139 females to every 100 males.

Parentage.—There were 28 of native parentage and 46 of foreign, or a ratio of 61 native to every 100 of foreign parentage.

Season.—The seasons do not as a rule have a notable influence in regard to the mortality from peritonitis.

PNEUMONIA.

There were 776 decedents from pneumonia, in 1893. The number is 121 more than in 1892.

This number represents 10.4 per cent. of *all causes*, and a proportion of 2.04 to every one thousand of the *population*.

Sex.—Of the 776 decedents from pneumonia, and including congestion of the lungs, 412 were males and 364 were females; or about 88 females to every 100 males.

Parentage.—By parentage there were 319 of native and 457 of foreign parentage. The proportion of decedents from pneumonia was about 70 of native to each 100 of foreign parentage.

Season.—There were 384, or about 49 per cent., of the deaths that occurred during the first four months of the year. The largest mortality by months was 104 in April, 103 in March, 100 in May, and 98 in December.

Pneumonia, as a cause of death, has increased in the ratio to whole number of deaths, during the last twenty-five years, from an average of 5.8 per cent., during the first ten years, to an average of 8.3 per cent. during the last ten, including 1893.

The following Table presents, for each of the last twenty-nine years, the number and the percentage, with the sex and the parentage of the decedents from pneumonia; and the number in each year, in each division of the State:

TABLE LXXXVI.

Mortality in the State from Pneumonia, 1865 to 1893, inclusive.

YEARS.	Number of Deaths.	Per cent.	SEX. Males.	SEX. Females.	PARENTAGE. Native.	PARENTAGE. Foreign.	DIVISIONS OF THE STATE. Bristol County.	Kent County.	Newport County.	Providence County.*	Providence City.	Washington County.
5 yrs. 1865-1869.	921	5.9	445	476	570	351	45	55	72	281	403	65
1870-1874.......	1,113	5.7	570	543	636	477	46	56	52	335	542	82
1875..	400	9.3	199	201	243	157	14	27	25	105	198	31
1876...........	339	8.2	164	175	162	177	13	23	16	97	163	27
1877...........	226	5.1	104	122	127	99	10	7	14	81	98	16
1878	317	7.1	143	174	176	141	10	11	18	110	140	28
1879......	311	7.4	148	163	163	148	7	15	15	103	156	15
1875-1879.	1,593	7.3	758	835	871	722	54	83	88	496	755	117
1880..	364	7.9	180	184	177	187	26	16	18	92	192	20
1881	327	6.5	177	150	190	137	10	23	17	81	174	22
1882...........	344	7.2	178	166	163	181	10	22	21	91	176	21
1883	400	7.8	192	208	198	202	19	21	34	108	204	14
1884..	363	7.1	167	196	192	171	10	13	17	125	172	26
1880-1884.......	1,798	7.1	894	904	920	878	75	95	110	497	918	103
1885..	465	8.6	214	251	271	191	15	20	33	151	227	19
1886	481	8.2	232	249	234.	217	17	29	37	161	209	28
1887......	488	7.7	260	228	227	261	13	27	39	142	227	40
1888	508	7 7	274	234	227	281	16	37	29	171	219	36
1889..	483	7.7	255	228	213	270	18	37	29	169	208	22
1885-1889.	2,425	8.0	1,235	1,190	1,172	1,253	79	150	167	794	1,090	145
1890...... . ..	569	8.2	288	281	247	322	16	36	30	206	246	35
1891..	568	8.5	270	298	247	321	17	40	70	183	232	26
1892...........	655	8.8	335	320	265	390	18	57	52	216	277	35
1893	776	10.4	412	364	319	457	18	42	49	232	392	43
Total, 29 years..	10,418	7.3	5,207	5,211	5,247	5,171	368	614	690	3,240	4,855	651

* Not including Providence city.

TABLE LXXXVII.

Exhibiting the Number of Decedents from Pneumonia, in each of the several Periods of Life, during each of the last twenty-nine years, from 1865 to 1893, inclusive.

YEARS.	Under 5.	5 to 10.	10 to 15.	15 to 20.	20 to 30.	30 to 40.	40 to 50.	50 to 60.	60 to 70.	70 to 80.	80 and over.	Not stated.
1865	65	4	2	...	14	11	15	17	21	21	5	...
1866	57	4	4	5	12	10	14	21	25	32	9	....
1867	57	9	2	3	10	11	13	16	25	13	12	1
1868	70	4	3	3	15	8	16	13	19	27	13	...
1869	64	11	1	2	11	12	9	28	25	16	11	...
1870	84	6	5	4	6	7	8	14	20	19	8	1
1871	71	7	2	7	10	17	16	16	35	17	19	1
1872	83	5	1	7	17	20	19	22	24	19	11	1
1873	105	4	8	3	10	14	16	17	24	23	10	....
1874	76	9	4	6	17	17	25	21	40	27	8	....
1875	120	9	3	8	22	30	35	39	61	43	28	2
1876	116	5	4	3	20	20	32	35	48	39	17	...
1877	79	2	....	7	15	15	21	27	22	24	9	2
1878	115	9	4	10	14	17	28	20	42	45	13	...
1879	102	8	1	3	14	27	26	35	38	38	19	...
1880	95	18	3	16	14	33	37	46	47	43	12	....
1881	102	4	2	5	15	22	26	45	48	31	26	1
1882	71	3	4	14	22	36	49	33	41	46	21	4
1883	88	15	2	13	32	33	40	53	49	46	27	2
1884	103	14	5	11	23	34	24	32	53	37	23	4
1885	121	9	10	8	23	29	50	49	76	59	29	2
1886	111	10	7	19	32	35	50	58	74	55	30	....
1887	132	15	7	7	32	43	51	56	64	53	28	....
1888	103	20	5	15	49	48	61	62	70	54	21	...
1889	120	14	3	20	27	36	51	57	77	47	31	....
1890	161	7	10	12	46	55	55	55	79	54	33	2
1891	126	10	4	11	42	54	60	70	84	70	37	....
1892	139	10	9	10	39	69	75	74	110	71	44	5
1893	176	25	8	17	49	68	96	115	102	70	50	....
Total, 29 years	2,912	270	123	249	652	831	1021	1,146	1,443	1,139	604	28

Age.—Of the decedents from pneumonia, during the period of twenty-nine years, nearly 28 per cent. were under five years of age. Of over fifty years of age the number of decedents was 41.6 per cent. of the whole number.

The following summary will present the percentages for 1893, in round numbers :

Under five years of age	23 per cent.
Five years and under twenty, and not stated	6 per cent.
Twenty years and under fifty	28 per cent.
Fifty years and over	43 per cent.

SCARLATINA.

The number of deaths returned as having been caused by scarlatina, in 1893, was 193. The number is 126 more than in 1892.

This number represents 2.6 per cent. of *all causes*, and a proportion of .50 to every one thousand of the *population.*

Sex.—Of the 193 decedents from scarlatina, 86 were males and 107 were females ; or about 124 females to every 100 males.

Parentage.—There were 75 of native parentage, and 118 of foreign ; a proportion of about 157 of foreign parentage to every 100 of native.

The following Table will present the statistics of scarlatina for the last thirty-nine years, from 1855 to 1893, inclusive, the number and percentage and sex of the decedents from scarlatina, and the number from scarlatina in each division of the State. It also shows, from 1865 to 1893, inclusive, the *parentage* of the decedents from scarlatina :

TABLE LXXXVIII.

Mortality in the State from Scarlet Fever, 1855 to 1893, inclusive.

YEARS.	Number of Deaths.	Per cent.	SEX.		PARENTAGE.		DIVISIONS OF THE STATE.					
			Males.	Females.	Native.	Foreign.	Bristol County.	Kent County.	Newport County.	Providence County.*	Providence City.	Washington County.
10 yrs, 1855-1864	1,256	4.9	611	645	......	......	46	62	189	334	568	57
1865-1869.......	676	4.3	324	352	316	360	58	43	27	206	309	33
1870-1874.......	943	4.9	455	488	420	523	33	29	51	289	475	66
1875	185	4.3	85	100	121	64	8	30	3	35	94	15
1876..........	80	1.9	34	46	42	38	3	2	7	21	35	12
1877..........	62	1.4	26	36	29	33	14	4	3	21	12	8
1878	86	1.9	41	45	35	51	3	5	3	14	47	4
1879.	311	7.4	164	147	130	181	3	6	4	37	255	6
1875-1879......	724	3.3	350	374	357	367	31	47	20	128	453	45
1880	468	10.0	215	253	216	252	22	30	11	143	243	19
1881	138	3.0	79	59	62	76	11	25	12	41	45	4
1882......... ..	45	0.9	24	21	16	29	......	3	16	7	18	1
1883...........	34	0.6	17	17	14	20	1	1	5	9	16	2
1884...........	97	1.8	39	58	41	56	......	......	8	28	57	4
1880-1884.......	782	3.1	374	408	349	433	34	59	52	228	379	30
1885	91	1.7	36	55	48	43	......	3	6	24	38	20
1886	88	1.5	46	42	29	59	......	13	2	41	30	2
1887...........	266	4.2	120	146	95	171	9	16	4	80	154	3
1888...........	207	3.1	101	106	91	116	1	29	10	87	80	......
1889	51	0.8	24	27	14	37	3	2	6	14	25	1
1885-1889. . ..	703	2.4	327	376	277	426	13	63	28	246	327	26
1890........ ...	16	0.2	11	5	6	10	......	3	......	2	8	3
1891...........	33	0.5	17	16	12	21	1	3	......	9	17	3
1892..........	67	0.9	38	29	21	46	1	4	4	20	38	...
1893	193	2.6	86	107	75	118	1	23	3	68	97	1
Total, 39 years.	5,393	3.9	2,593	2,800	1,833	2,304	218	336	374	1,530	2,671	264

* Not including Providence city.

CROUP, DIPHTHERIA AND SCARLATINA.—*Season and Mortality.*

The following Table is continued, to show by comparison the *influence* of *season* in regard to the mortality from croup and scarlatina for forty-one years, and diphtheria for *thirty-six* years. The Table will give the average *monthly* and *quarterly* percentages of deaths from each cause:

TABLE LXXXIX.

MONTHS.	CROUP. 1853–1893.		DIPHTHERIA. 1858–1893.		SCARLATINA. 1853–1893.	
	Number of deaths.	Per cent.	Number of deaths.	Per cent.	Number of deaths.	Per cent.
January	381	12.53	459	9.75	729	12.12
February	330	10.85	340	7.22	658	10.94
March	277	9.11	361	7.66	590	9.80
First Quarter	988	32.49	1,160	24.63	1,977	32.86
April	216	7.10	315	6.69	498	8.28
May	156	5.13	324	6.88	539	8.96
June	135	4.44	282	5.99	460	7.65
Second Quarter	507	16.67	921	19.56	1,497	24.89
July	104	3.42	275	5.84	350	5.82
August	88	2.89	297	6.31	284	4.72
September	179	5.89	346	7.34	303	5.04
Third Quarter	371	12.20	918	19.49	937	15.58
October	325	10.69	589	12.50	415	6.90
November	431	14.17	587	12.46	518	8.61
December	419	13.78	535	11.36	671	11.16
Fourth Quarter	1,175	38.64	1,711	36.32	1,604	26.67
Totals	3,041	100.00	4,710	100.00	6,015	100.00

SUICIDE.

The number of deaths by suicide, in Rhode Island, during 1893, was 21, which is 2 more than in the preceding year.

There were 18 male and 3 female decedents from that cause, or a proportion of about six males to every one of the females.

Of the 21, 10 were of native parentage and 11 of foreign.

The means of self-destruction, according to the returns, were as follows: By cutting the throat, three males and one female; by cyanide of potassium, two males; by drowning, two males; by hanging, four males; by opium, one female; by Paris green, one male; by poison unspecified, one male; by shooting, four males; by suffocation from illuminating gas, one male; unspecified, one female.

The proportion of suicides, to all other causes of death in Rhode Island, during 28 years has, in but one quinquennial period, exceeded one-half of one per cent.

Deaths by suicide have been more than 15 per cent. less during the last ten years than during the first ten of the twenty-nine years, as may be seen in the following Table, although in 1891 the proportion was six-tenths of one per cent., and more than twice as large as that of 1890 and of 1892.

Table XC.

Mortality in the State from Suicide, with the Percentage of the Whole Number of Deaths, Sex, Parentage and Locality, for twenty-nine years, from 1865 to 1893, inclusive.

YEARS.	Number of Deaths.	Per cent.	SEX.		PARENTAGE.		DIVISIONS OF THE STATE.					
			Males.	Females.	Native.	Foreign.	Bristol County.	Kent County.	Newport County.	Providence County.*	Providence City.	Washington County.
5 yrs, 1865-1869.	71	.50	54	17	56	15	3	6	5	23	29	5
1870-1874	90	.52	67	23	61	29	2	10	8	25	40	5
1875	26	.63	17	9	14	12	1	1	.....	6	13	5
1876	18	.46	15	3	6	12	.....	.....	1	5	10	2
1877	22	.52	16	6	15	7	.....	2	1	5	12	2
1878	21	.50	16	5	12	9	3	2	.....	5	7	4
1879	13	.31	10	3	5	8	.....	.....	.....	5	7	1
1875-1879.......	100	.48	74	26	52	48	4	5	2	26	49	14
1880...........	10	.20	5	5	8	2	.....	1	1	6	2	.....
1881...........	23	.49	19	4	15	8	.....	5	3	.....	14	1
1882	31	.64	23	8	23	8	1	4	3	8	12	3
1883	25	.47	18	7	11	14	.....	.....	2	8	15	.....
1884	22	.43	20	2	13	9	.....	1	1	6	11	3
1880-1884.......	111	.45	85	26	70	41	1	11	10	28	54	7
1885...........	20	.37	16	4	11	9	1	1	6	3	6	3
1886	17	.29	16	1	12	5	1	3	2	4	7	.....
1887...........	16	.25	13	3	8	8	2	.....	2	5	7	.....
1888	21	.42	20	1	15	6	.....	1	3	6	9	2
1889	24	.38	20	4	9	15	.....	2	5	7	10	.....
1885-1889......	98	.34	85	13	55	43	4	7	18	25	39	5
1890..........	19	.28	15	4	12	7	2	.....	1	8	5	3
1891..........	40	.61	27	13	15	25	2	2	.....	10	24	2
1892	19	.26	15	4	10	9	.....	.....	4	6	8	1
1893	21	.38	18	3	10	11	.....	2	.....	7	12	.....
Total, 29 years.	569	.41	440	129	341	228	18	43	48	158	260	42

* Not including Providence city.

WHOOPING COUGH.

The number of deaths from whooping cough, returned in 1893, was 23, 2 less than the number in 1892.

Of the 23 decedents from whooping cough, 8 were males and 15 were females.

There were 9 decedents of native parentage and 14 of foreign, or a proportion of 64 of native to 100 of foreign.

Of the 23 decedents, 21 were under 5 years of age, and the remaining 2 were between 5 and 10 years of age.

The following Table will present the mortality from whooping cough, for twenty-nine years, 1865–1893, inclusive, with the death-rate, sex, parentage, etc., of the decedents:

TABLE XCI.

Mortality in the State from Whooping Cough—1865–1893.

YEARS.	Number of Deaths.	Per cent.	SEX. Males.	SEX. Females.	PARENTAGE. Native.	PARENTAGE. Foreign.	DIVISIONS OF THE STATE. Bristol County.	Kent County.	Newport County.	Providence County.*	Providence City.	Washington County.
5 yrs, 1865–1869.	170	1.09	86	84	75	95	2	12	17	62	70	7
1870-1874.......	168	.86	69	99	68	100	2	12	13	47	90	4
1875	31	.72	15	16	12	19	2	1	......	20	7	1
1876	48	1.17	19	29	20	28	5	3	1	7	31	1
1877..........	32	.72	18	14	6	26	......	.....	1	15	16	......
1878..........	54	1.22	26	28	30	24	......	1	......	9	43	1
1879	43	.96	17	26	22	21	......	11	1	12	15	4
1875-1879.......	208	.96	95	113	90	118	7	16	3	63	112	7
1880	20	.41	10	10	7	13	......	......	2	6	11	1
1881..........	68	1.36	33	35	30	38	.....	2	2	24	40	......
1882	71	1.40	33	38	32	39	......	4	......	26	40	1
1883	9	.17	6	3	5	4	1	......	......	4	4	......
1884..........	43	.83	17	26	23	20	5	.....	2	6	28	2
1880-1884.......	211	.83	99	112	97	114	6	6	6	66	123	4
1885	42	.79	23	19	24	18	......	1	4	9	24	4
1886..........	49	.83	28	21	17	32	4	3	......	18	23	1
1887..........	21	.32	9	12	10	11	......	......	4	6	10	1
1888	44	.75	17	27	16	28	......	3	2	11	28	......
1889..........	77	1.23	39	38	36	41	1	12	1	20	43	......
1885-1889.......	233	.77	116	117	103	130	5	19	11	64	128	6
1890	70	1.00	25	45	25	45	2	2	7	27	30	2
1891..........	77	1.16	39	38	37	40	3	1	3	15	54	1
1892	25	.34	10	15	14	11	......	1	3	12	9	......
1893	23	.31	8	15	9	14	1	.....	4	9	7	2
Total, 29 years..	1,185	.86	547	638	518	667	28	69	67	365	623	33

* Not including Providence city.

TABLE XCII.

Presenting the ratio of Mortality to the Whole Number of Specified Causes of Death, of twenty-three Prominent Causes, for nineteen years, 1875–1893.

CAUSES OF DEATH.	YEARS.								
	1875.	1876.	1877.	1878.	1879.	1880.	1881.	1882.	1883.
Accidents (all kinds)	3.31	3.40	3.10	2.89	2.43	3.51	3 04	3.44	2.84
Apoplexy and Paralysis	3.61	4.01	4.25	4.45	5.21	4.67	5.23	5 52	5.39
Brain, Diseases of	2.98	3.64	3.68	3.28	3.73	3.44	3 84	3 60	3.50
Bronchitis	1.39	1.46	1.62	1.89	1.47	1.98	1.80	2 08	2.04
Cancer	2.31	2.72	3.17	2.82	2 96	2.72	3.11	2.75	3.30
Cholera Infantum	7.74	6.41	6.08	3.97	3.81	5.43	5.15	6.77	4.73
Consumption	15.79	16.78	15.52	15.98	15.09	14.02	15 12	15.33	15.01
Convulsions	2.43	2.28	1.95	2.65	2.47	2.88	2.18	2.29	2.47
Croup	2.33	2.61	2.23	2.20	2.28	1.45	2.16	1.60	1.40
Debility*	2.61	2.80	2.65	1.91	2.35	3.09	2.61	2.69	1.14
Diarrhœa	1.70	1.87	2.11	1.25	1.26	1.52	1.65	1.87	2.55
Diphtheria	.80	4.07	11.56	10.28	6.14	3.40	4.63	2.10	1.88
Dysentery	.88	1.28	1.22	.95	1.04	.61	.90	1.42	1.06
Fevers	3.40	3.00	3.55	3.94	2.70	3 37	3.05	4.60	5 12
Heart, Diseases of	4.31	4.03	4.28	3.92	4.78	5.03	5.68	5.31	6 35
Whooping Cough	.75	1.23	.75	1.28	1.02	.44	1.46	1.48	.17
Hydrocephalus	1.24	1.74	1.29	1.65	1.36	1.01	1.20	1.02	.87
Kidneys, Diseases of	1.58	1.28	1.57	1.89	1.88	2.02	1.69	1.79	2.43
Liver, Diseases of	1.14	1.15	1.06	1.06	1.17	1.20	.82	1.21	.83
Marasmus	1.46	1.13	.99	1.50	1.16	1.27	1.11	1.62	2.02
Old age	5.25	6.18	5.00	5.25	5.22	5.95	5.29	5.89	5.22
Pneumonia	7.83	8.69	5.31	7.49	7.37	7.90	7.01	7 16	7.84
Scarlatina	4.50	2.05	1.46	2.03	7.37	9.99	2.96	.94	.64

* Not infantile.

TABLE XCII.—Continued.

CAUSES OF DEATH.	YEARS.									
	1884.	1885.	1886.	1887.	1888.	1889.	1890.	1891.	1892.	1893.
Accidents (all kinds)	3.80	3.09	3.22	3.25	3.01	3.46	3.60	3.54	4 18	3.58
Apoplexy and Paralysis	5.78	5 38	5.69	4,17	5.50	5.17	4.91	5.08	4.89	5.52
Brain, Diseases of	2.97	3 61	3.11	3.29	3.43	3.03	3 13	3.36	3.33	3.49
Bronchitis	2.29	3.09	2.96	2.77	3.42	4.20	4.01	3.74	4.16	4.24
Cancer	3.03	3.59	2.77	2.50	2.99	3.03	2.41	2.66	2.45	2.78
Cholera Infantum	6.31	5.16	6.27	5.60	7.08	6.80	8.39	8.25	8.56	8.18
Consumption	14.34	14.45	14.12	11.19	12.13	11.61	12.29	11.18	10.26	9.79
Convulsions	2.70	2.06	2.06	2.51	2.31	2.17	2.24	1.97	2.19	2.05
Croup	1.55	1.74	1.55	1.79	1.19	1.28	1.19	1.01	1.20	.68
Debility*	2 87	2.45	2.91	1.18	1.38	2.07	1.93	1.82	1.72	1.45
Diarrhœa	2.20	1.55	1.59	2.09	1.20	1.40	1.37	1.26	1.73	1.59
Diphtheria	2.31	1.83	3.90	4.53	2.86	2.93	3.04	1.54	1.20	2.13
Dysentery	.78	.68	1.13	1.04	1.11	1.14	1.25	.89	.96	.57
Fevers	3 21	2.93	2.87	2.00	3.58	2.29	2.26	2.37	1.88	1.61
Heart, Diseases of	5 60	6.48	6.20	6.46	6.56	7.35	5.84	7.25	6.84	7.26
Whooping Cough	.83	.79	.83	.32	.75	1 23	1.00	1.16	.31	.31
Hydrocephalus	.81	.31	.41	.41	.47	.20	.37	.34	.30	.42
Kidneys, Diseases of.	2.52	3.14	2.64	2.66	3.24	3.38	3.20	3.71	3.49	4.10
Liver, Diseases of.	.88	.87	1.08	1.34	1.19	1.30	.94	2.23	1.20	.98
Marasmus	1.62	2.15	.22	1.57	1.16	1.63	,96	1.19	.94	1.14
Old Age	5.68	4.95	4.69	4.38	4.35	3.63	2.87	2.80	3.46	2.48
Pneumonia	7.14	8.65	8,18	7.70	7.62	7.69	8.20	8.60	8.85	10.53
Scarlatina	1.88	1.70	1.50	4.20	3.11	,82	,23	.50	.91	2.62

* Not infantile.

Table XCII.

Summary of the Principal Occupations and Causes of Death from June 1, 1852, to January 1, 1894, a period of Forty-two years and Seven months. Ages under 20 excluded.

OCCUPATIONS.	Whole Number.	Accidents.	Alcoholism.	Apoplexy and Paralysis.	Asthma.	Bladder Diseases.	Bowel Diseases.	Brain Diseases.	Bronchitis.	Cancer.	Diabetes.	Diarrhœa and Dysentery.	Dropsy.	Epilepsy.	Erysipelas.	Fevers, Malarial.	Fevers, Typhoid, etc.	Heart Diseases.	Hernia.	Insanity.	Kidney Diseases.	Liver Diseases.	Old Age.	Peritonitis.	Phthisis.	Pleurisy.	Pneumonia.	Rheumatism.	Stomach Diseases.	Suicide.	Tetanus.
Males.																															
Agents	166	13	5	11		4	2	6	5	6	1	3	2	1	3	1	11	16		1	15	4	3	3	32	1	12		2	3	
Bakers	119	8	1	13	1	2	3		1	4	3	1	5	1		1	3	12	1	1	6	4	7	1	23		7	3	2	3	2
Bankers and Brokers	101	3	1	11		2	2	3	1	5	2	1			1	1	5	18		1	12	3	6		12		11			3	
Barbers	186	6	5	9	1		3	8	2	3		2	1			1	8	17			9	2	3	2	87		13	2		2	
Blacksmiths	518	24	13	53	1	1	10	19	5	18	3	9	12	2	4	3	23	43		1	23	17	30	4	141	1	42	4	5	7	
Bleachers	46	1		1	1		1	2		1		2	1		1		2	3			3		3	2	15	2	4		1		
Boilermakers	55	7	3	6				3				1					1	7	1		2				17	1	3	1		1	1
Bookbinders	27		1	1			2	2						1			1	1			1	1	2		10		3	1			
Book-keepers	313	17	4	29	1	4	1	10	3	3	4	1	3		2		13	22		1	25	9	7	2	111	3	29	2	2	4	1
Cabinetmakers	107	3	1	10	1	1	3	6	2	4	1	1	1		1			13			3	5	15		26	1	6	1	1	1	
Calico Printers	51	2	6	5	1		1	1		2		1	1					6			1	1	4		13		3			3	
Carpenters	1,602	136	20	133	5	15	27	49	20	56	5	32	26	5	11	1	72	145	4	14	67	35	113	15	367	6	167	13	17	24	2
Carriage Makers and Trimmers	61	2		7				1	4	3		1	1		1		2	4			5	4	2		17	1	5			1	
Cigarmakers	80	2	2	1		1	1	1	2	5			1				3	5			4	2	3		37		7	1	2		

TABLE XCIII.—Continued.

OCCUPATIONS.	Whole Number.	Accidents.	Alcoholism.	Apoplexy and Paralysis.	Asthma.	Bladder Diseases.	Bowel Diseases.	Brain Diseases.	Bronchitis.	Cancer.	Diabetes.	Diarrhœa and Dysentery.	Dropsy.	Epilepsy.	Erysipelas.	Fevers, Malarial.	Fevers, Typhoid, etc.	Heart Diseases.	Hernia.	Insanity.	Kidney Diseases.	Liver Diseases.	Old Age.	Peritonitis.	Phthisis.	Pleurisy.	Pneumonia.	Rheumatism.	Stomach Diseases.	Suicide.	Tetanus.
CLERGYMEN	187	4	...	22	...	3	1	4	8	8	3	6	1	1	1	1	5	23	..	4	9	12	19	...	21	...	23	2	3	3	..
CLERKS AND SALESMEN	836	35	12	42	...	5	16	21	8	19	7	8	...	3	2	1	76	59	..	8	47	12	3	9	297	4	103	12	11	13	..
CONFECTIONERS	31	1	...	1	1	1	...	1	1	1	...	2	2	...	...	..	2	3	..	...	3	2	1	...	9	...	2	...	...	1	..
COOPERS	107	3	1	16	1	2	3	1	4	1	1	1	3	...	1	1	4	8	2	1	4	3	17	...	18	1	8	...	...	2	..
DENTISTS	27	1	...	3	...	...	1	2	2	1	...	1	...	...	...	..	4	4	..	...	1	...	1	...	4	...	2	...	...	...	..
DYERS	93	6	...	6	1	...	5	2	1	1	...	4	2	1	1	..	10	14	..	...	2	...	6	1	17	...	10	...	2	1	..
ENGINEERS AND FIREMEN	277	47	3	26	1	5	3	9	3	8	2	4	2	...	1	3	9	30	..	1	22	9	5	2	47	..	31	...	4	...	..
ENGRAVERS	105	4	2	8	...	1	3	3	2	3	...	...	5	1	...	..	6	14	..	2	3	3	1	...	35	...	4	...	3	2	..
FARMERS, ETC	5,483	226	50	610	18	102	118	136	59	215	39	113	197	15	55	9	245	598	17	33	159	115	932	17	709	33	462	44	47	69	11
FILE-CUTTERS	61	...	1	5	...	...	2	2	3	...	...	...	1	...	...	..	1	4	..	...	..	...	1	...	31	...	8	...	...	2	..
FISHERMEN AND OYSTERMEN	176	31	3	9	...	2	3	5	...	6	2	2	5	...	2	..	14	13	1	1	4	6	21	...	31	...	8	2	1	2	2
GASFITTERS	42	1	2	4	...	...	...	...	...	3	...	...	...	...	...	..	1	3	..	1	4	...	...	..	19	1	1	..	2	...	..
GROCERS	355	6	6	42	6	8	4	12	5	16	3	5	4	2	5	3	15	35	..	3	21	14	24	7	62	2	34	1	4	6	..
HARNESSMAKERS AND SADDLERS	92	6	3	5	...	...	...	5	1	2	1	2	1	1	1	..	3	9	..	...	4	3	3	...	28	...	9	...	2	3	..
HOTEL-KEEPERS	122	3	3	12	1	1	3	6	2	2	..	3	3	...	...	1	2	18	1	3	7	10	5	...	22	1	7	1	1	4	..
JEWELERS	804	31	12	59	3	9	10	14	12	12	5	15	6	2	6	2	40	65	1	15	34	16	5	9	345	...	47	5	10	14	..
LABORERS	7,659	726	162	409	46	70	176	148	183	170	24	167	102	27	45	37	375	575	14	40	235	153	529	38	2132	51	799	56	92	68	10

LAWYERS	132	5	1	19	1	2	1	10	...	1	...	2	1	1	1	..	5	21	1	4	13	5	6	..	21	...	8	1	2	...	..
MANUFACTURERS	495	23	3	71	3	16	8	18	10	23	10	7	7	1	6	1	26	60	2	4	36	9	23	3	60	1	44	3	11	6	..
MACHINISTS	1,156	68	15	104	3	11	13	44	16	31	8	19	17	4	7	1	48	104	2	9	51	20	39	3	332	11	134	10	17	15	..
MASONS	665	40	6	63	5	11	10	14	13	34	6	6	11	...	2	4	23	66	1	7	37	14	54	8	108	2	97	3	13	7	..
30 MERCHANTS	989	21	6	133	4	15	24	54	10	42	7	20	13	11	12	..	43	140	1	13	66	26	69	7	139	4	84	5	10	9	1
MILLERS	37	5	1	4	...	...	1	1	1	1	...	1	..	1	...	..	1	1	..	...	2	2	3	...	7	...	4	...	...	1	..
MOULDERS	236	13	4	19	1	...	2	3	7	6	1	4	1	...	1	..	17	17	..	3	9	1	5	1	60	2	52	3	2	2	..
MUSICIANS	51	3	2	9	..	...	...	4	1	2	1	...	1	...	...	..	2	3	..	1	5	1	1	...	9	...	3	1	1	1	..
OPERATORS	1,796	128	24	83	2	9	41	45	39	36	8	33	24	5	10	7	111	139	8	18	68	35	42	10	614	14	170	22	25	25	1
PAINTERS AND GLAZIERS	640	48	11	81	1	8	12	18	6	15	2	18	6	1	3	1	15	69	3	14	31	15	20	2	156	7	58	6	6	7	..
PATTERN-MAKERS	55	1	2	10	...	1	1	1	...	4	..	1	...	...	1	..	2	12	..	...	2	...	2	..	9	1	4	1	...	...	..
PEDDLERS	122	8	4	11	1	1	2	2	2	3	...	2	...	...	1	..	6	14	..	1	6	2	8	...	27	...	17	2	...	2	..
PHYSICIANS	238	7	4	37	1	3	5	12	2	10	3	5	1	...	1	1	6	31	1	5	12	6	12	2	38	1	24	1	5	2	..
PLUMBERS	75	11	1	4	..	...	1	4	2	...	...	1	..	...	1	1	5	5	..	...	2	...	1	...	24	...	11	...	...	1	..
PRINTERS	154	4	2	8	...	2	2	4	5	6	1	1	2	1	..	..	6	1	12	1	7	4	3	2	60	1	13	2	2	2	..
RUBBER-WORKERS	120	3	...	7	...	1	1	3	4	6	...	3	1	..	...	..	8	6	..	1	3	1	...	...	59	...	11	1	...	1	..
SAILMAKERS	28	4	1	2	...	2	...	1	...	...	1	...	...	...	...	..	1	4	1	2	1	...	...	...	4	...	1	...	1	2	..
SAILORS, ETC.	661	79	19	62	1	4	10	24	8	10	2	17	13	5	8	4	52	54	2	5	22	12	50	2	127	4	48	7	4	5	1
SHOEMAKERS	489	15	15	55	2	6	6	11	8	16	2	16	12	1	6	1	18	42	1	5	21	16	56	3	112	2	29	5	3	4	..
SHIP-MASTERS	128	6	1	30	..	3	1	6	4	4	...	1	4	3	3	..	...	14	..	3	9	1	17	...	5	1	9	...	...	3	..
SILVERSMITHS	88	2	3	7	...	...	1	3	...	2	1	1	1	...	3	..	4	9	..	...	5	1	5	1	32	1	6	...	...	...	..
STONECUTTERS AND MARBLE-WORKERS	211	15	2	7	1	1	4	5	6	7	4	3	2	1	1	..	13	21	..	3	6	2	6	1	72	...	18	3	5	2	..
STUDENTS	61	3	...	...	...	...	1	6	1	1	..	1	...	...	...	..	12	1	..	...	1	...	1	1	26	...	4	...	..	2	..
TAILORS	339	10	7	30	2	8	6	7	8	9	...	11	6	1	...	1	10	38	..	1	28	9	13	1	95	2	27	4	2	3	..
TEAMSTERS	395	51	4	26	...	4	9	7	2	18	3	7	6	2	4	3	27	43	..	2	21	10	10	4	90	2	27	4	4	3	2

TABLE XCIII.—Continued.

OCCUPATIONS.	Whole Number.	Accidents.	Alcoholism.	Apoplexy and Paralysis.	Asthma.	Bladder Diseases.	Bowel Diseases.	Brain Diseases.	Bronchitis.	Cancer.	Diabetes.	Diarrhoea and Dysentery.	Dropsy.	Epilepsy.	Erysipelas.	Fevers, Malarial.	Fevers, Typhoid, etc.	Heart Diseases.	Hernia.	Insanity.	Kidney Diseases.	Liver Diseases.	Old Age.	Peritonitis.	Phthisis.	Pleurisy.	Pneumonia.	Rheumatism.	Stomach Diseases.	Suicide.	Tetanus.
TANNERS AND CURRIERS	38	5	...	4	...	...	1	..	1	2	...	...	...	...	1	1	2	4	..	..	1	1	4	...	4	...	3	2	...	2	..
TEACHERS AND PROFESSORS	103	3	..	9	...	1	1	5	3	5	..	1	3	1	...	..	10	6	..	1	3	2	5	...	34	...	6	1	1	2	..
TINSMITHS	94	7	2	7	1	1	...	2	...	1	...	..	1	1	...	..	7	3	..	1	3	3	4	1	35	1	8	2	2	1	..
UPHOLSTERERS	47	3	..	2	...	1	...	...	1	...	...	...	..	...	1	..	1	5	..	...	6	...	..	...	21	...	3	...	1	2	..
WHEELWRIGHTS	76	4	3	8	...	2	...	1	3	3	...	...	...	...	1	..	3	10	..	1	4	3	9	...	11	1	8	...	...	1	..
MALES	29,614	1950	465	2181	119	352	568	800	502	906	166	569	521	103	218	92	1440	2730	77	236	1216	646	2239	164	7126	167	2801	240	331	355	34
Females.																															
DRESSMAKERS AND SEAMSTRESSES	273	5	...	12	1	...	1	4	7	21	1	5	3	...	3	2	13	23	..	1	10	5	6	6	110	2	18	2	6	3	..
MILLINERS	38	1	1	1	...	...	1	...	...	2	...	1	...	..	...	..	4	5	..	...	5	1	...	1	11	...	3	...	1	...	..
NURSES	75	3	...	9	..	...	2	3	...	5	...	1	2	...	...	..	7	8	..	1	5	1	7	1	8	1	10	...	...	1	..
OPERATIVES	688	17	4	17	...	...	12	6	21	17	1	10	8	..	4	4	39	34	..	3	12	5	7	13	383	5	49	6	8	3	..
TAILORESSES	126	...	...	12	1	...	1	1	...	8	2	2	2	...	1	..	6	8	..	3	2	1	13	...	50	...	9	1	2	1	..
TEACHERS	171	3	...	6	...	1	4	4	2	14	3	3	1	1	...	1	12	7	..	1	2	2	10	...	74	1	15	1	2	1	..
FEMALES	1,371	29	5	57	2	1	21	18	30	70	7	22	16	1	8	7	81	85	..	9	36	15	43	21	636	9	104	10	19	9	..
TOTAL	30,985	1979	470	2538	121	353	589	818	532	976	173	591	537	104	226	99	1521	2815	77	245	1252	661	2282	185	7762	176	2905	250	350	364	34

Table XCIV.

Occupations and Ages of Decedents from June 1, 1852, to January 1, 1894, comprising a period of Forty-one years and seven months. Occupations under Ten, and Ages under Twenty, excluded.

OCCUPATIONS.	Total Mortality.	Aggregate Ages.	Average Age.	OCCUPATIONS.	Total Mortality.	Aggregate Ages.	Average Age.
Males.							
Actors	12	413	34.42	Stable Keepers	70	3,853	55.04
Agents	193	9,997	51.79	Brakemen	85	2,443	28.74
Artists	29	1,409	48.59	Brewers	15	742	49.47
Bakers	123	8,913	72.46	Brick and Stone Layers	12	568	47.33
Bankers and Brokers	115	6,801	59.14	Butchers and Marketmen	245	12,595	51.41
Bank Officers	62	3,965	63.95	Calico Printers	57	3,106	54.49
Barbers	204	7,617	37.34	Calkers	11	815	74.09
Bartenders	27	1,031	38.18	Carpenters and Joiners	1,755	96,473	54.97
Blacksmiths, etc	580	31,254	53.89	Civil Engineers	38	1,908	50.21
Bleachers and Fullers	57	2,852	50.04	Clerks and Salesmen	953	35,413	37.16
Boat Builders	23	1,349	58.65	Clergymen	211	13,356	63.30
Boatmen	24	1,377	57.29	Clothiers	11	655	59.55
Boiler Makers	64	2,529	39.52	Coachmen	166	7,197	43.35
Box "	14	590	42.14	Collectors	16	967	60.44
Broom and Brush Makers	14	708	50.57	Confectioners	37	1,652	44.65
Cabinet "	123	7,110	57.80	Contractors and Builders	68	3,919	57.63
Carriage, etc., "	65	3,478	53.51	Cooks and Caterers	65	3,089	47.52
Cigar "	94	4,183	44.50	Coopers	116	7,651	65.96
Harness, etc., "	100	4,844	48.44	Dentists	32	1,701	53.16
Pattern "	63	3,623	57.51	Designers	13	653	50.23
Pump and Block "	14	788	55.71	Druggists and Apothecaries	78	3,469	44.47
Rope "	25	1,672	66.88	Dyers	110	5,574	50.67
Sail "	32	1,886	58.94	Die Sinkers	18	833	46.28
Sash and Blind "	10	506	50.60	Drivers	20	790	39.50
Shoe "	537	30,916	55.71	Cab, etc	36	1,562	43.39
Tool "	19	1,021	53.74	Car and Conductors	23	844	36.70
Watch "	30	1,640	54.67	Engineers and Firemen	309	14,756	47.75
Bookbinders	24	1,121	46.71	Engravers	121	5,786	47.82
Book-keepers	359	15,891	44.26	Expressmen	78	3,905	50.06
Hotel "	144	7,965	55.31	Farmers	6,022	401,142	66.66
Saloon, etc., Keepers	169	7,677	45.43	File-cutters	72	2,930	40.69

Table XCIV.—Continued.

OCCUPATIONS.	Total Mortality.	Aggregate Ages.	Average Age.	OCCUPATIONS.	Total Mortality.	Aggregate Ages.	Average Age.
Nail Cutters	11	422	38.35	Operatives	2,038	88,858	43.60
Fish and Oyster Dealers	15	903	60.20	Painters and Glaziers	723	33,968	46.98
Junk Dealers	11	627	57 00	Paper Hangers	20	1,058	52.90
Liquor "	90	4,014	44.60	Peddlers	147	7,381	50.21
Fishermen and Oystermen	203	10,007	49.30	Photographers and Lithographers	24	1,098	45.75
Florists	25	1,271	50.84	Physicians	274	16,306	59.51
Founders	10	381	38.10	Pilots	18	994	55.22
Gardeners	248	14,540	55.49	Plasterers, etc	42	2,017	48.02
Gas Fitters	51	2,162	42.39	Plumbers	78	3,063	39.27
Gentlemen	42	2,792	66.48	Polishers	17	800	47.06
Grocers	384	20,766	54.08	Porters	40	1,932	48.30
Gun and Locksmiths	24	1,314	54.75	Printers	168	973	57.92
Hatters	23	1,225	53.26	Public Officers	73	4,376	59.94
Hostlers	101	4,238	41.96	Railroad Officials	80	3,649	45.62
Janitors	58	2,941	50.71	Riggers	22	1,254	57.00
Jewelers	859	34,914	40.64	Roll Coverers	27	1,631	60.41
Journalists	31	1,409	45.45	Rubber Workers	127	5,196	40 91
Judges and Justices	15	981	65.40	Sailors	232	11,304	48.72
Laborers	8,475	417,792	49.30	Sea-captains	147	9,866	67.12
Lamplighters	15	795	53.00	Servants	22	1,003	45.59
Lawyers	150	8,265	55.10	Sheriffs, Police, etc	104	5,801	55.78
Machinists	1,286	61,748	48.02	Ship-carpenters	66	4,503	68 23
Mail Carriers	11	506	46.00	Silversmiths	100	4,464	44.64
Manufacturers	532	32,207	60.54	Soldiers	139	4,252	30.59
Mariners	513	25,300	49.32	Stevedores	15	712	47.77
Masons	734	41,749	56.88	Stewards	16	693	43.31
Mechanics	449	23,825	53.06	Stone-cutters, etc	224	11,260	50.27
Merchants	1,108	65,414	59.06	Students	68	1,542	22.68
Millers	42	2,465	58.69	Superintendents, etc	234	12,777	54.60
Millwrights	31	2,032	65.55	Tailors	371	20,297	54.71
Miners	14	771	55.07	Tanners and Curriers	43	2,667	62.02
Moulders	263	12,102	39.34	Teachers and Professors	125	6,087	48.70
Musicians	60	2,885	48.08	Teamsters	479	22,660	47.30
Naval Officers	16	765	47.81	Telephone and Telegraph Operators	18	533	29.61
Nurses	13	681	52.38	Tinsmiths	100	4,402	44.02

Table XCIV.—Continued.

OCCUPATIONS.	Total Mortality.	Aggregate Ages.	Average Age.	OCCUPATIONS.	Total Mortality.	Aggregate Ages.	Average Age.
Tobacconists............	10	594	59.40	Dress-makers, etc	297	12,512	42.13
Traders	280	14,071	50.25	Housewives	165	8,562	51.89
Tradesmen, General.. ...	184	8,863	48.17	Jewelers...	14	376	26.86
Undertakers.....	38	2,204	58.00	Laboring	16	699	43.69
Upholsterers...	47	1,879	39.98	Laundresses..........	28	1,382	49.36
Waiters....	104	4,259	40.95	Milliners.	53	1,899	35.83
Watchmen............ ..	137	7,547	55.09	Nurses	92	5,729	62.27
Wheelwrights.	95	5,700	60.00	Operatives	836	26,009	31.11
Wood Turners..........	37	1,364	36.86	Rubber Workers..........	13	406	31.33
Wool Sorters....	42	1,994	47.48	Servants and Domestics ..	438	21,146	48.28
				Sisters of Mercy	27	1,012	37.48
Total................	36,520	1,967,864	52.52	Tailoresses	140	6,437	45.98
Females.				Teachers................	200	10,557	52.79
Boarding-house Keepers ..	22	1,377	62.59				
Housekeepers....	2,310	129,964	55.54	Total...........	4,734	220,412	46.56
Clerks and Saleswomen...	20	579	28.95				
Cooks.......	33	1,766	53.52	Grand total	42,254	2,188,276	51.85

Table XCV.

Occupations of Grooms.

OCCUPATIONS.	Number.	OCCUPATIONS.	Number.
Actors	6	Hotel Keepers	6
Agents	20	Saloon "	4
Army Officers	3	Stable "	5
Architects	3	Bottlers	8
Artists	3	Brakemen	18
Authors	1	Brewers	3
Baggage Masters	3	Brick and Stone Layers	11
Bakers	24	Bridgeman	1
Bankers and Brokers	10	Butchers and Marketmen	52
Bank Officers	4	Butlers	3
Barbers	38	Calkers	1
Bar Tenders	15	Captains, U. S. L. S. S	2
Blacksmiths	46	Carpenters	166
Bleachers	9	Civil Engineers	9
Boat Builders	1	Chemists	2
Boatmen	8	Clerks and Salesmen	235
Belt Makers	1	Clergymen	11
Boiler "	6	Coachmen	24
Box "	1	Collectors	4
Broom and Brush Makers	1	Commercial Travelers	16
Button "	2	Compositors	4
Cabinet "	5	Concreters	2
Carriage "	3	Conductors, U. R. R	10
Chandelier "	1	Confectioners	10
Cigar "	2	Contractors and Builders	10
Clock "	1	Cooks and Caterers	14
Harness "	8	Coopers	2
Horse Shoe "	3	Coppersmiths	1
Pattern "	6	Cutters	1
Pen (gold) "	1	Dentists	2
Rope "	1	Designers	3
Shoe "	26	Die Sinkers	2
Watch "	2	Druggists	21
Bookbinders	3	Dyers	25
Book-keepers	40	Draughtsmen	18

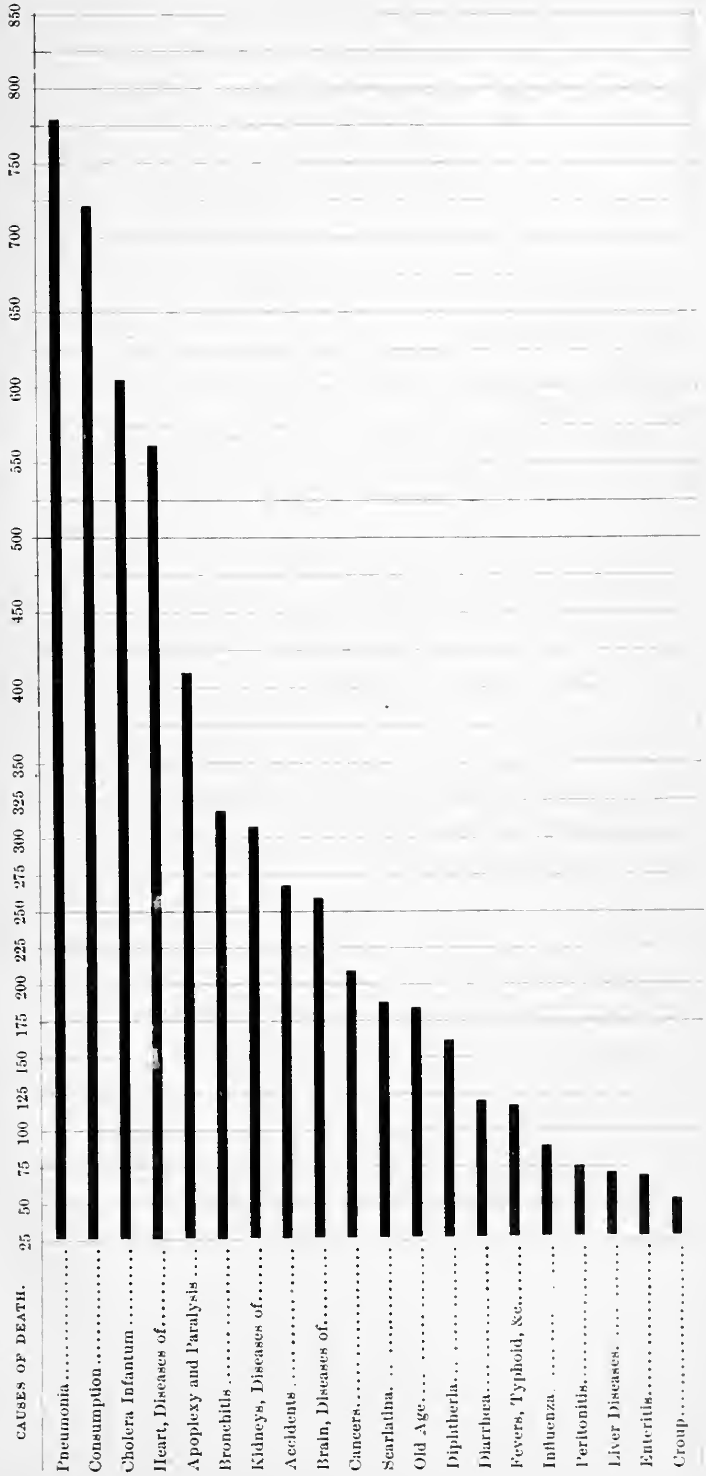
TABLE XCV.—Continued.

OCCUPATIONS.	Number.	OCCUPATIONS.	Number.
Drivers	16	Hostlers	14
Cab	4	House Movers	1
Car, etc	5	Inspectors	3
Electricians	17	Insurance Agents	7
Engineers and Firemen	66	Iron Workers	4
Electric Car Conductors	1	Janitors	7
Electric Plater	4	Jewelers	75
Enamelers	2	Journalists	1
Engravers	14	Laborers	339
Expressmen	12	Laundrymen	6
Express Messengers	2	Lawyers	10
Farmers	140	Lighthouse Keepers	2
File-cutters	4	Linemen	11
Finishers (cloth)	2	Machinists	190
Fire Company Members	7	Lumbermen	1
Fish and Oyster Dealers	1	Mail Carriers	5
Hardware "	2	Manufacturers	31
Ice "	1	Mariners	9
Liquor "	10	Masons	37
Real Estate "	3	Mechanics	26
Shoe "	7	Merchants	57
Wood and Coal "	1	Messengers	1
Fishermen and Oystermen	15	Milkmen	13
Florists	3	Millers	4
Fortune Tellers	1	Millwrights	1
Founders	6	Miners	1
Fruiterers	2	Motormen	2
Gardeners	17	Moulders	36
Gas Fitters	16	Musicians	12
Gilders	1	Operatives	478
Glass Pressers	1	Painters	84
Gold Refiners	2	Paper Hangers	5
Grocers	43	Peddlers	12
Grooms	3	Photographers and Lithographers	5
Gun and Locksmiths	2	Physicians	17
Hatters	5	Platers	1
Horse Trainers	2	Plasterers	6

TABLE XCV.—Continued.

OCCUPATIONS.	Number.	OCCUPATIONS.	Number.
Plumbers	18	Stucco Workers	1
Polishers	10	Students	2
Porters	6	Superintendents and Overseers	38
Printers	29	Switchmen	4
Produce Dealers	5	Tailors	16
Public Officers	5	Tanners and Curriers	3
Publishers	2	Taxidermists	1
Railroad Officials	12	Teachers and Professors	10
Railroad Postal Clerk	1	Theatrical Managers	3
Reporters	2	Teamsters	107
Riggers	1	Telephone and Telegraph Operators	4
Roll Coverers	4	Tinsmiths	11
Rubber Workers	31	Tradesmen, General	3
Sailors	15	Undertakers	2
Scale Builders	1	Upholsterers	5
Sea-captains	3	Veterinary Surgeon	1
Servants	3	Waiters	10
Sextons	1	Watchmen	9
Sheriffs, Police, etc	11	Weighers	1
Ship-carpenters	1	Wheelwrights	4
Silversmiths	27	Wire Drawers	1
Slaters	2	Wood Workers	11
Speculators	1	Wool Sorters	4
Stenographers	13	Not stated	87
Stevedores	1		
Stewards	2	Total	3,544
Stone-cutters	32		

Diagram III. Exhibiting the comparative mortality by absolute number of decedents, from twenty principal causes of death in Rhode Island, in 1893.



APPENDIX A.

NOMENCLATURE OF DISEASES

OR

CAUSES OF DEATH.

NAMES OF CAUSES OF DEATH.

It should be stated that the nomenclature of diseases in the nosological arrangement on the following pages is not intended to include the names of the whole list of morbid phenomena affecting the human organism, but the names of such only as are directly the cause of death, or such as ordinarily predispose to or set in motion the morbid processes that end in death.

In the construction of the classification now adopted, use has been made of the results and conclusions of a committee of the Royal College of Physicians of England, and from such other sources as were accessible, and from examination of the classifications in use in different countries in Europe and America. It has been the design to have all these classifications based on observed facts and most advanced conclusions in relation to pathological processes and morbid conditions, inductive, causative, progressive and ultimate.

The statistical nosology will consist of two lists of causes of death,

A TABULAR LIST AND SUPPLEMENTAL LIST.

The Tabular List comprises the chief or primary causes of death which will be used in Table IX, on Classification and Percentage, in the preparation of the Registrar's annual reports, and will, therefore, include all those named in the Supplemental List, when the final arrangement is completed.

The Supplemental List is subordinate to the Tabular List, and contains synonyms, or names of related diseases, which may be actually, or are supposed to be, causes of death, and which are in addition to those in the Tabular List, and which are often found in physician's certificates of death, as reported to the State Registrar. These will have a place, in alphabetical order, in Tables VII and VIII of the reports, and will be variously grouped under different heads in Table IX, as the figure which precedes each cause in the Supplemental List will correspond, in the representation of diseased conditions, with the figure in the class and order in the Tabular List, under which that cause is placed.

NOMENCLATURE OF CAUSES OF DEATH.

CLASSES.

I. General Diseases.—A.	SPECIFIC AND FEBRILE.	(*Zymotic.*)
II. General Diseases.—B.	CACHECTIC.	(*Constitutional.*)
III. Special Diseases.—A.	FUNCTIONAL OR ORGANIC.	(*Local.*)
IV. Special Diseases.—B.	DEVELOPMENTAL.	(*Developmental.*)
V. Violence. —C.	FROM INJURIES, ETC.	(*Violent.*)

SUB GROUPS OR ORDERS.

CLASS I.—**Zymotic Diseases.**

ORDER ONE, Miasmatic. ORDER TWO, Enthetic. ORDER THREE, Dietic. ORDER FOUR, Parasitic.

CLASS II.—**Constitutional Diseases.**

ORDER ONE, Diathetic. ORDER TWO, Tubercular.

CLASS III.—**Local Diseases.**

ORDER ONE, Diseases of the Nervous System. ORDER TWO, Organs of Circulation. ORDER THREE, Organs of Respiration. ORDER FOUR, Organs of Digestion. ORDER FIVE, Urinary Organs. ORDER SIX, Reproductive Organs. ORDER SEVEN, Osseous and Locomotory Organs. ORDER EIGHT, Integumentary System.

CLASS IV.—**Developmental Diseases.**

ORDER ONE, Of Children. ORDER TWO, Of Women. ORDER THREE, Of Old Age. ORDER FOUR, Of Nutrition.

CLASS V.—**Deaths by Violence.**

ORDER ONE, Accidents and Negligence. ORDER TWO, Homicide. ORDER THREE, Suicide.

STATISTICAL NOSOLOGY.

CLASS I.—Zymotic Diseases.

TABULAR LIST.

For Table IX of the Registration Report.

Order One.—Miasmatic.

I. One.—1. Carbuncle . . . . .
2. Cholera, Asiatic . . . .
3. Cholera, Sporadic . . . .
4. Cholera Infantum . . . .
5. Cholera Merbus . . . .
6. Croup (Pseudo Membranous) .
7. Diphtheria . . . . .
8. Diarrhœa . . . . .
9. Dysentery . . . . .
10. Erysipelas . . . . .
11. Fever, Bilious . . . .
12. Fever, Cerebro Spinal . .
13. Fever, Intermittent . . .
14. Fever, Malarial . . . .
15. Fever, Typhoid . . . .
16. Fever, Typho-Malarial . .
17. Fever, Unspecified . . . .
18. Fever, Yellow . . . .
19. Influenza (Epidemic) . .
20. Measles . . . . . .
21. Mumps . . . . . .
22. Metria (Puerperal Fever) .
23. Pertussis . . . . .
24. Tonsilitis . . . . .
25. Scarlatina . . . . .
26. Small Pox . . . . .
27. Varicella . . . . . .

Order Two.—Enthetic.

I. Two.—1. Glanders . . . . . .
2. Gonorrhœa . . . . .
3. Hydrophobia . . . . .
4. Malignant Pustule . . . .
5. Septicæmia . . . . .
6. Syphilis . . . . . .

Order Three.—Dietic.

I. Three.—1. Alcoholism . . . . .
2. Delirium Tremens . . . .
3. Inanition . . . . .
4. Opium Habit . . . . .
5. Purpura and Scurvy . . .

Order Four.—Parasitic.

I. Four.—1. Apthæ . . . . . .
2. Worms . . . . . .
3. Other Parasites, ...

SUPPLEMENTAL LIST.

Synonyms or Related Diseases.

Order One.—Miasmatic.

I. One.—1. Anthrax.
Gangrenous Boil.
4. Entero Colitis, } Infantile.
Gastro Enteritis, }
10. Hospital Gangrene.
Pyemia.
Phagadena.
Phlegmon.
15. Infantile Fever.
Typhus Fever.
20. Rotheln.
21. Parotitis.
22. Child-bed Fever.
23. Whooping Cough.
24. Quinsy.
25. Scarlet Fever.
Angina Maligna.
26. Varioloid.
27. Chicken Pox
Miliaria.

Order Two.—Enthetic.

I. Two.—2 Stricture of Urethra.
Gonorrheal Opthalmia.
5. Necusia.

Order Three.—Dietic.

I. Three —1. Intemperance.
2. Privation.
Starvation.
Neglect.

Order Four.—Parasitic.

I. Four.—1 Thrush.
2. Tape Worm.
Trichinosis.
3 Scabies
Hydatids.
Porrigo, Favus, etc.

CAUSES OF DEATH.

CLASS II.—Constitutional Diseases.

TABULAR LIST.

Order One.—Diathetic.

II. One.—1. Gout
2. Dropsy
3. Anæmia
4. Cancer, Various
5. Cancer of Breast
6. Cancer of Stomach
7. Cancer of Uterus
8. Noma (Canker)
9. Gangrene
10. Rheumatism

Order Two.—Tubercular.

II. Two.—1. Scrofula
2. Tabes Mesenterica
3. Phthisis (Pulmonary)
4. Hydrocephalus
5. Tubercular Meningitis

SUPPLEMENTAL LIST.

II. One.—2. Anasarca.
3. Leucocythæmia.
Chlorosis.
4. Soft Cancer.
Epithelioma.
Melanosis.
Lupus.
Other kinds of Cancer.
9. Bed Sore
Dry Gangrene.
10. Rheumatic Carditis.
Rheumatic Synovitis.
Rheumatic Meningitis.

II. Two.—1. Psoas (Lumbar) Abscess.
White Swelling.
Cretnism (Goitre.)
Adenitis.
Lymphangitis.
Morbus Coxarius.
Pott's Disease.
2. Tubercular Peritonitis.
3 Hæmoptysis.

CLASS III.—Local Diseases.

Order One.—Nervous System.

III. One.—1. Cephalitis
2. Cerebritis
3. Apoplexy
4. Paralysis
5. Insanity
6. Chorea
7. Epilepsy
8. Tetanus
9. Convulsions*
10. *Brain Diseases**
11 *Nerve Diseases*

Order Two.—Circulatory System.

III. Two.—1. Pericarditis
2. Aneurism
3. *Heart Diseases**

III. One.—1. Phrenitis.
Meningitis.
Cerebro Spinal Meningitis. (Sporadic.)
Paresis.
4. Locomotor Ataxia.
5. Monomania.
Fright.
Grief.
Melancholia.
Dementia.
Rage.
6. Hysteria.
8. Laryngismus.
Lockjaw.
Trismus Nascentium.
Cephalæmatoma.
10. Neuralgia, Cerebral.
Neurasthenia.
Disease of Spinal Cord.
Necrencephalus (Ramollissement).
11. Nervous Prostration.
Neuritis.
Myelitis.

III. Two.—1. Carditis
Endocarditis.
3 Hypertrophia.
Atrophia.
Angina Pectoris
Syncope.
Arteritis.
Ossification of Arteries. (Sclerosis.)
Phlebitis.
Hydropericardium.
Embolus.
Thrombosis.

* Not otherwise placed.

STATISTICAL NOSOLOGY.

CLASS III.—Local Diseases.—Continued.

TABULAR LIST.

Order Three.—Respiratory System.

III. Three.—1. Epistaxis . . . . .
2. Laryngitis . . . .
3. Bronchitis, Acute . .
4. Bronchitis, Chronic . .
5. Pleurisy . . . . .
6. Pneumonia . . . . .
7. Asthma . . . .
9. *Lung Diseases** . . .

Order Four.—Digestive System.

III. Four.—1. Gastritis . . . . .
2. Enteritis . . . . .
3. Peritonitis . . . . .
4. Ascites . . . . .
5. Ulceration of Intestines .
6. Hernia . . . . .
7. Ileus . . . . . .
8. Intussusception . . .
9. Stricture of Intestines .
10. Fistula . . . . .
11. *Stomach Diseases** . .
12. *Pancreas Diseases** . .
13. Hepatitis . . . . .
14. Jaundice . . . . .
15. *Liver Diseases** . . .
16. *Spleen Diseases** . . .
17. *Bowel Diseases** . . .

Order Five.—Urinary System.

III. Five.—1. Nephritis . . . . .
2. Ischuria . . . . .
3. Nephria (Bright's Disease) .
4. Diabetes . . . . .
5. Calculus (Gravel, &c.) .
6. Cystitis . . . . .
7. Prostate Disease of . .
8. *Kidney Diseases** . . .
9. Bladder, Diseases of . .
10. Testicles, Disease of . .

Order Six.—Generative System.

FEMALE.

III. Six.—1. Ovarian Dropsy . . .
2. *Diseases of Uterus** . .

SUPPLEMENTAL LIST.

III. Three.—2. Œdema Glottidis.
5. Empyema.
Diaphragmitis.
Pneumothorax.
Hydrothorax.
6. Pulmonary Apoplexy.
Hæmoptysis.†
Congestion of Lungs.
7. Grinders' Asthma.
Miners' Asthma.
Emphysema.
8. Pleurodynia.

III. Four.—1. Glossitis.
Stomatitis
Pharyngitis.
Œsophagitis. } Not
2. Gastro Enteritis. } In-
Entero Colitis. } fantile.
5. Perforation of—
6. Congenital.
Femoral.
Inguinal.
Scrotal.
Umbilical.
Ventral.
7. Constipation.
Obstipation.
Perityphlitis.
Typhlitis.
Appendicitis.
8. Invagination.
9. Strict. Œsophagus.
11. Dyspepsia.
Pyrosis.
Gastralgia.
Hæmatemesis.
Melæna
14. Gall-stones.
Icterus Neonatorum.
15. Cirrhosis.
Chyluria.

III. Five.—3. Albuminuria.
6. Cystirrhœa.
8. Diuresis.
Hæmaturia.
Uræmia.
9. Urethritis.
10. Orchitis.
Hydrocele.

III. Six.—1. Ovarian Tumor.
2. Hysteritis Metritis.
Uterine Ulcer.
Polypus, Tumor Fibroid.
Ovaritis.
Pelvic Cellulitis.
Hemorrhage.

* Not otherwise placed

† See Class II, Order Two—3, Sup. List.

CAUSES OF DEATH.

CLASS III.—Local Diseases.—Continued.

TABULAR LIST.	SUPPLEMENTAL LIST.
ORDER SEVEN.—Osseous and Locomotory System.	
III. Seven.—1. Bones, Diseases of	III. Seven.—1. Ostitis. Periostitis. Fragilitas Ossium. Mollities Ossium. Rickets. Caries, Necrosis. Exostosis.
2. *Joint Diseases**	2. Synovitis. Hip Diseases.
3. Vertebræ, Diseases of	3. Spine Diseases. Spine, Caries and Necrosis.
ORDER EIGHT.—Integumentary System.	
III. Eight.—1. Phlegmon‡	III. Eight.—1. Abscess, part not stated. Boil. Whitlow.
2. Ulcer	
3. *Skin Diseases*	3. Roseola. Urticaria. Eczema. Herpes. Pemphigus. Ecthyma. Impetigo. Psoriasis, &c. Dermatitis (from burns, &c.).
ORDER NINE.—Organs of Special Sense. EYE AND EAR.	
III. Nine.—1. Malignus Oculi	
2. Opthalmitis	
3. Ossis Petrosis	
4. Otitis	

CLASS IV.—Developmental Diseases.

TABULAR LIST.	SUPPLEMENTAL LIST.
ORDER ONE.—Developmental Diseases of Children.	
IV. One.—1. Still born	
2. Debility, Infantile	IV. One.—2. Asthenia.
3. Debility, Premature Birth	
4. Cyanosis	4. Atelectasis Pulmonum.
5. Spina Bifida	
6. Other Malformations	6. Anus Imperforatus. Cleft Palate. Idiocy.
7. Teething	
8. Innutrition	8. Malnutrition.
9. Hemorrhage	9. Umbilical Hemorrhage.

* Not otherwise placed. † See Class II, Order Two—1, Sup. ‡ See Class I, Order One—10, Sup.

STATISTICAL NOSOLOGY.

CLASS IV.—Developmental Diseases.—Continued.

TABULAR LIST.	SUPPLEMENTAL LIST.
Order Two.—Developmental Diseases of Women.	
IV. Two.—1. Paramenia	IV. Two.—1. Amenorrhœa. Chlorosis.† Climacteria. Menorrhagia.
2. Childbirth*	2. Miscarriage. Abortion. Puerperal Mania Puerperal Convulsions. Phlegmasis Dolens. Cæsarian Operation. Extra-Uterine Fœtation. Flooding. Retention of Placenta Presentation of Placenta. Deformed Pelvis. Mammary Abscess. Vomiting of Pregnancy.
Order Three.—Developmental Diseases of Old People.	
IV. Three.—1. Old Age	
Order Four.—Diseases of Nutrition. Adolescent and Adult.	
IV. Four.—1. Atrophy	IV. Four.—1. Marasmus. Malnutrition.
2. Debility	2. Asthenia. Exhaustion.

CLASS V.—Deaths by Violence.

TABULAR LIST.	SUPPLEMENTAL LIST.
Order One.—Accident or Negligence.	
V. One.—1. Fractures and Contusions	V. One.—1. Railroad and other Accidents.
2. Wounds, Unspecified	
3 Burns and Scalds	
4. Poison	
5. Drowning	5. Lost at Sea.
6. Suffocation	6. Asphyxia. Strangulation.
7. Various	7. Exposure. Cold Water. Frozen. Heat. Lightning. Surgical Operation. Sun Stroke.
Order Two.—Homicide.	V. Two.—1. Infanticide. Patricide. Matricide. Fratricide. Filicide, &c.
Order Three.—Suicide.	
V. Three.—1. Wounds, Unspecified	
Wounds, Pistol or Gunshot	
Wounds, Knife	
2. Poison	
3. Drowning	
4. Hanging	
5. Otherwise	

* See Class I, Order One—22, Tab. List.

† See Class II, Order One—3, Sup.

SUGGESTIONS

CONCERNING

Physicians' Certificates of Causes of Deaths.

It should be the endeavor to specify the causes of death as definitely and correctly as possible. It is not unusual to find a return of death with the physician's certificate naming the cause of death "Paralysis," "Paraplegia," "Fits," "Convulsions," "Dropsy," etc., which are merely secondary or consecutive causes, simply symptoms only, or results of some organic lesion or pathological derangement. Sometimes **the alleged cause** is really the *final cause*, as in a case of termination of life by paralysis, but the cause given as paralysis **is not the determining cause.** Apoplexy, or some lesion of the nervous centres, must be the original and determining cause of paralysis, paraplegia, hemiplegia, etc, and the determining cause should be stated as the primary in the return or certificate.

Convulsions are the symptoms or results of some antecedent or concurrent disease. They follow meningitis and other structural lesions of the nervous centres: they also occur from reflex derangement or disturbance of the nervous centres, as, in children, from intestinal irritation, or from inflammation, as in gastritis, enteritis, nephritis, etc. In such cases they may be contributory to death, and perhaps, in rare instances, a final cause, by inducing or taking the form of tonic or tetanic spasm. But as contributory, or as a final cause, they are simply concomitant. They should find a place as secondary causes only in certificates of death.

"Fits" is too unmeaning a term to be used in any case. The word in a medical sense means a paroxysm, a tonic or clonic spasm, or an attack or succession of attacks of some physical or mental disturbance, as "a fit of apoplexy," "a fit of melancholia," etc., and is not properly used as synonymous with convulsions from any cause. It would be just as sensible to attribute a death to a "paroxysm," an "occurrence" or an "attack" as a cause, as to "fits," without some qualification.

"Dropsy" and "Ascites" have been allowed to stand as determining causes of death because of extended use, and because of the obscurity with which their causes in rare instances are involved. We can scarcely conceive of a dropsical accumulation without antece-

dent organic or functional disorder, derangement of the absorbent or secretory system, or depravation of the blood. They are left in the tabular list with not a little reluctance. Paralysis, with cause unspecified, is also left in the tabular list for a like reason, and with the same doubt of propriety.

It may be suggested that it is sometimes difficult, and occasionally impossible, to ascertain positively the chief or leading cause of death. The physician last in attendance may find several functional or structural diseases, the morbid conditions multiple and complex, and not only the initial derangement, but the succession of morbid processes, proximate, consecutive and ultimate, inextricably entangled and lost to discovery.

The careful diagnostician will, however, even then be able to *conceive the probable leading cause*, but whether or not, he will be able at least to ascertain the most prominent and controlling lesion or functional derangement then existing, and which may reasonably be accepted as the chief cause of death.

The preceding remark applies very properly to cases of adventitious diseases which prove fatal, when occurring in individuals already suffering from some chronic disease of slower progress, as when fatal dysentery attacks a consumptive person, or one having chronic nephritis dies from pneumonia. The acute disease occurring independently of the chronic disease is the chief cause of death, although the fatal event may have been made more sure by the existence of the antecedent disease, and although the antecedent disease would have ultimately caused death.

In attributing deaths to scrofula, tuberculosis, tumor, cancer and other generic terms, as causes, the organic structure or locality where the disease is developed should always be given, if possible, otherwise such terms are very indefinite.

The objects desired in presenting the preceding nomenclature of causes of death, and the suggestions following, are to subserve the purpose of greater uniformity and precision in the use of nosological terms, and to promote the accomplishment of entire definiteness, accuracy and completeness in the physician's certificates of causes of death.

The State of Rhode Island has a leading reputation for the completeness of its vital statistics It is not excelled, if equalled, by any State in the Union. With the exception of two or three, there are no States that have even any approximate completeness of numbers of decedents, and fullness of statements of fact connected therewith. It is hoped that the physicians of Rhode Island will feel a professional and patriotic interest in the continued elevation of the reputation of the State as a collector of accurate and complete vital statistics.

APPENDIX B.

THE LAWS OF RHODE ISLAND

IN RELATION TO THE REGISTRATION OF

BIRTHS, MARRIAGES AND DEATHS,

AND OF DIVORCE.

PUBLIC STATUTES, CHAPTER 85, AND PUBLIC LAWS, CHAPTER 747.

OF THE REGISTRATION OF BIRTHS, DEATHS AND MARRIAGES.

SECTION 1. The town clerks of the several towns, or any person whom the board of aldermen of any city, or the town council of any town may appoint for that purpose, shall obtain, chronologically record and index, as required by the forms prescribed by section three of this chapter, all information concerning births, marriages and deaths occurring among the inhabitants of their respective towns; and on or before the first Monday in March, annually, shall make duly certified returns thereof to the secretary of the state board of health, for the year ending on the thirty-first day of December next preceding, accompanying the same with a list of the persons required by law to make returns to them, who have neglected to do so, and with such remarks relating to the object of this chapter as they may deem important to communicate.

SEC. 2. The secretary of the state board of health shall receive the returns made in pursuance of the preceding section, and annually make a general abstract and report thereof, in form as prescribed by section three of this chapter, and publish not exceeding one thousand copies thereof, and for preparing, tabulating and publishing said annual report the sum of five hundred dollars shall be paid to the state registrar. Said returns, after such report is prepared, shall be deposited in the office of the secretary of state, who shall cause the same to be arranged, full alphabetical indices of all the names to be made, and the whole to be bound in volumes of convenient size and carefully preserved in his office.

SEC. 3. The blank forms required to carry out the provisions of this chapter shall, on application, be furnished by the secretary of the state board of health to clergymen, physicians, undertakers, town clerks, clerks of meetings of the Society of Friends, and other persons requiring them, substantially as follows: The record of a birth shall state the date and place of birth, name and sex of the child, whether born alive or still-born, the name and surname, color, occupation, residence and birthplace of the parents, and the time of recording, so far as the same can be ascertained. The record of a marriage shall state the date of the marriage, place, name, residence and official station of the person by whom married, names and surnames of the parties, age, color, occupation and residence of each, condition, that is, whether single, widowed or divorced, what marriage, that is, whether first, second, third or other marriage, the occupation, birthplace and name of their parents, and the time of recording, so far as the same can be ascertained. The record of deaths shall state the date of death, name and surname of the deceased, the sex, color and condition, whether single or married, age, occupation, place of death, place of birth, names and birthplace of parents, disease or cause of death, and the time of recording, so far as can be ascertained.

SEC. 4. Every meeting of the Society of Friends, clergyman, and all others authorized to join persons in marriage, shall make a faithful record of every such rite performed by them, in manner and form aforesaid, and return the same for the last preceding month, on or before the second Monday of every month, to the town clerk of the town in which such rite shall have been performed; and no marriage shall be solemnized until the parties shall have signed and delivered to the person about to solemnize it, or to the clerk of a meeting of the Society of Friends, a certificate containing the information required for the record of a marriage, as prescribed by this chapter.

SEC. 5. The town clerk of every town shall annually, in the month of January, collect the information required by this chapter, in relation to all children born in the town during the year ending on the thirty-first day of December next preceding.

SEC. 6. Whenever any person shall die, or any still-born child shall be brought forth in this state, the physician attending at such bringing forth or last sickness, if any physician so attended, shall, within forty-eight hours after such death or bringing forth, leave with the family, if any, or person having the care of the deceased, or the person bringing forth such still-born child, or give to the under taker, or person who conducts the funeral, a certificate stating, in case of a death, the name of the deceased, the date of the death, and the disease or cause of the death, and in case of the bringing forth of a still-born child, the date and the cause of such child being brought forth still-born. Provided, however, if the physician last in attendance shall not have knowledge of such death, or is otherwise reasonably prevented from leaving with the family or giving the undertaker such certificate within the time hereinbefore specified, or before the funeral or disposal of the remains of the deceased, he shall, within five days after having

knowledge of such death by notification or otherwise, send to the town or city clerk or registrar of the town or city in which such death occurred a certificate, stating the name, date and disease or cause of death of such decedent.

SEC. 7. Every town council may appoint a sufficient number of persons to act as undertakers, removable at the pleasure of such council.

SEC. 8. No undertaker or other person shall conduct a funeral, or bury or deposit in a tomb, or remove from this state, or otherwise dispose of the remains of any deceased person or still-born child unless he shall first obtain the physician's certificate required by section six of this chapter, if a physician was in attendance upon such person who has deceased, or the person bringing forth such still-born child, and shall return the same, together with his own certificate of the information required by section three of this chapter, to the town clerk of the town where such death or bringing forth took place. Provided, however, that in such towns as allow the burial or removal of the bodies of deceased persons without a permit from the town clerk, and the undertaker or other person who has charge of the disposal of the remains of the deceased person is unable to obtain the said physician's certificate, after reasonable attempts therefor before the burial or removal of the said remains, then the said undertaker or other person shall make his return as required by section three of this chapter, including the cause of death and the name of the physician last in attendance upon the deceased, immediately to the town or city clerk or registrar of the town or city in which the death occurred. He shall, also, within two days thereafter, notify the physician last in attendance upon the deceased person of the name and date of death of the same.

SEC. 9. Any town may make ordinances more effectually to attain the objects herein contemplated.

SEC. 10. The town clerks, or persons appointed as aforesaid, shall receive for each record of a death made and returned as required by law, and for each record of a marriage made and returned as required by law, twenty cents, to be paid to them out of their respective town treasuries: *Provided*, that the yearly compensation to be paid out of the town treasury as aforesaid, to any one town clerk or person appointed as aforesaid, who shall perform the duties prescribed by this chapter, shall not be less than five dollars. Undertakers and others making returns of deaths as required by sections six and eight of this chapter, shall receive for each full report of a death made to the town clerk five cents in the cities of Providence and Newport, and ten cents in the other towns of the state.

SEC. 11. Every clergyman, physician, undertaker, town clerk, clerk of any meeting of the Society of Friends, or other person who shall wilfully or unreasonably neglect or refuse to perform any of the duties imposed on or required of him by this chapter, shall be fined not exceeding twenty dollars nor less than two dollars for each offence, one-half thereof to the use of the town in which the offence shall occur, and one-half thereof to the use of the person who shall complain of the same.

SEC. 12. Every clergyman, physician, coroner, undertaker, medical examiner,

or clerk of any meeting of the Society of Friends, shall cause his name, residence and post office address to be recorded in the town clerk's office of the town where he resides.

SEC. 13. No letters of administration or letters testamentary shall be granted by any court of probate, upon the estate of any person, until the death of such person, or the facts from which the same is presumed, shall be duly certified, as near as may be, to the town clerk, in order that the same may be duly registered according to the provisions of this chapter.

SEC. 14. The town clerks of the several towns, the city clerk of the city of Newport, and the city registrar of the city of Providence, shall have the custody of all records of births, deaths and marriages of their respective towns, whether made under the statutes now in force or any former statute, and a certificate signed by them, certifying that any written or printed statement of any marriage, birth or death is a true copy of the record in their custody, shall be admitted as evidence of such marriage, birth or death.

SEC. 15. Births, marriages and deaths of non-residents shall be distinguished from those of residents, in the returns, by being arranged separately.

SEC. 16. The secretary of the state board of health may, from time to time, vary the forms of returns, and require such additional information as he may consider necessary to accomplish the object of this chapter.

SEC. 17. The town clerks or other officers appointed under this chapter to collect, record and return the births in the several towns, shall receive fees therefor as follows: For making record and return of these facts as required by law, twenty cents each for the first fifty entries in each calendar year, and ten cents each for each subsequent entry and return; to be paid by the town in which the birth is recorded.

SEC. 18. The town clerks of the several towns, or other persons appointed under this chapter to collect the births in the several towns, shall annually in the month of January collect the facts concerning the births within their respective towns, required by this chapter; and shall, so far as practicable, at the same time, collect the census of all persons between the ages of five and fifteen years inclusive, as provided by chapter fifty; and shall receive therefor such compensation as the town council or the board of aldermen of their respective towns or cities shall determine: *Provided*, that the city of Providence shall be exempt from so much of the provisions of this section as relates to the collection of the statistics of births.

SEC. 19. Blanks for the foregoing purposes shall be furnished, on application therefor, on or before the first day of December in the year preceding, by the state board of health for the collection of births, and by the commissioner of public schools for the census aforesaid.

SEC. 20. The person or persons who shall discharge the duties required by section eighteen of this chapter, if other than the town clerk, shall make full

return thereof to the town clerk of his or their town, on or before the tenth day of February next following.

Sec. 21. The returns required to be made by clerks of the supreme court, in relation to divorces, to the secretary of the state board of health, or a prepared abstract thereof, shall be published in the annual report on the births, marriages and deaths in the state.

CHAPTER 1262, PUBLIC LAWS.

[Passed May 4, 1894.]

AN ACT IN AMENDMENT AND IN ADDITION TO CHAPTER 85 OF THE PUBLIC STATUTES, "OF REGISTRATION OF BIRTHS, MARRIAGES AND DEATHS."

It is enacted by the General Assembly as follows:

Section 1. Section 17 of Chapter 85 of the Public Statutes is hereby amended so as to read as follows:

"Sec. 17. The town clerks or other officers appointed under this chapter to collect, record and return the births in the several cities and towns, shall receive fees therefor as follows: For making record and return of these facts as required by law, twenty cents for each entry and return; to be paid by the city or town in which the birth is recorded."

Sec. 2. The clerk or registrar of each town and city shall on the first day of each and every month make a certified copy of all births, marriages and deaths recorded in the books of said town or city during the previous month, whenever the parents of the child born, or the bride or the groom, or the deceased person, were resident in any other town or city in this State or in any other state at the time of said birth, marriage or death; and shall transmit such certified copies to the clerk or registrar of the town, city or state in which such parents of the child born, the bride or the groom, or the deceased, were resident at the time of said birth, marriage or death, stating in case of a birth, the name of the street and number of the house, if any, where such parents resided, the place of birth of such parents and the maiden name of the mother, whenever the same can be ascertained; and the clerk or registrar so receiving such certified copies shall record the same in the books kept for recording births, marriages and deaths. Such certified copies shall be made upon blanks to be furnished for that purpose by the secretary of the state board of health.

Sec. 3. This act shall take effect upon its passage.

SYNOPSIS OF THE LAW OF MARRIAGE.

CHAPTER 163, PUBLIC STATUTES.

SECTIONS 1, 2 and 3 show what kindred persons cannot marry, and declare marriages within prohibited degrees null and void.

SECTION 4 makes an exception in favor of Jews, within the degrees of affinity or consanguinity allowed by their religion.

SECTION 5 declares the marriage of persons having a husband or wife living, and of idiots and of lunatics, absolutely void.

SEC. 6. "Any ordained minister or elder of any religious denomination, who shall be *domiciled* in this state, and either justice of the supreme court, may join persons in marriage in any town in the state. (It will be seen that clergymen from other states *cannot* LAWFULLY *solemnize marriages* in Rhode Island.)

SEC. 8. Wardens in the town of New Shoreham may join persons in marriage in said town.

SECTION 9 provides that no minister, elder, magistrate or warden shall join persons in marriage, unless such persons, ***if residents of this state,*** shall first present (to the clergyman or other person officiating) a certificate properly executed and signed by the town or city clerk or city registrar of the town or city in which ***EACH of such persons shall RESPECTIVELY reside,*** and ***if not residents of this state,*** then from the town or city clerk or registrar of *the town or city in which the marriage shall be solemnized*, to the effect that the said town or city clerk or registrar has ***duly recorded the intention*** of marriage between the parties named in the certificate, the said certificate also setting forth the names and surnames of the parties, the age, color, occupation, birthplace and residence of each, whether either or both have been before married, and, if before married, whether the marriage intended is the first, second, third or other marriage, and also whether the condition of either or both persons previously married is that of a divorced person, and the names, occupation and birthplace of each of their parents; and no town or city clerk or city registrar shall issue such certificate to any minor person under guardianship, unless the consent in writing of the parent or guardian shall have first been obtained thereto: provided, however, such certificate may be issued to a female over eighteen years of age, who has no parent or guardian living in the United States. (The legal minority of both sexes terminates at the age of twenty one.)

SECTION 10 provides that every Society of Friends, and *every person* authorized to join persons in marriage, *shall certify* upon the certificate required in section nine of this chapter *the time when* and *the place where* the marriage shall have been

solemnized by him, and SHALL *on or before the second Monday of every month*, return the certificate of every marriage solemnized by him during the last preceding month to the *clerk or registrar* of the TOWN OR CITY *in which such rite shall have been performed.*

SECTION 11 forbids the solemnization of the marriage ceremony, by any person, when lawful objection is made thereto in writing, until such lawful objection be removed.

SECTIONS 12 and 13 provide that any person who shall join persons in marriage without first receiving the certificate required in section nine of this chapter, or otherwise contrary to or in violation of chapter 163 of the Public Statutes, shall be imprisoned not exceeding six months, or fined not exceeding one thousand dollars.

SECTION 14 provides that ALL PERSONS married without duly proceeding as required by chapter 163, shall be fined not exceeding fifty dollars.

SEC. 15. The solemnization of marriage shall be in the presence of two witnesses at least, besides the minister, elder or magistrate officiating.

SECTION 16 relates to marriage among Quakers or Friends, and among Jews, making them valid if in accordance with the forms, rites and ceremonies of the same respectively.

SECTION 17 provides that at least one of the parties to any marriage solemnized according to the manner and form of the Society of Friends, or rites and ceremonies of the Jewish religion shall, before the celebration thereof, sign and deliver to the town or city clerk or city registrar of the town or city in which such marriage is solemnized, the certificate required in section nine.

CHAPTER 167.

OF DIVORCE.

SECTION 1. Divorces from the bond of marriage shall be decreed in case of any marriage originally void or voidable by law, and in case either party is for crime deemed to be or treated as if civilly dead, or, from absence or other circumstances, may be presumed to be naturally dead.

SEC. 2. Divorces shall be decreed for impotency, adultery, extreme cruelty, willful desertion for five years of either of the parties, or for such desertion for a shorter period of time in the discretion of the court, for continued drunkenness, for neglect or refusal on the part of the husband, being of sufficient ability, to provide necessaries for the subsistence of his wife; and for any other gross misbehavior and wickedness in either of the parties, repugnant to and in violation of the marriage covenant.

Sec. 3. Whenever it shall appear that the absence, adultery, cruelty, desertion or other cause of complaint, as aforesaid, was committed or occasioned by the collusion of the parties, and done and contrived with an intention to procure a divorce, in such case no divorce shall be decreed.

Sec. 4. Whenever a divorce shall be had for the causes of affinity, consanguinity, impotency, idiocy, lunacy or crime of either of the parties, the wife shall have restored to her all her lands, tenements and hereditaments; and a judgment may be passed for a restoration to her of all or such part of the personal estate specifically, or the value thereof, which has come to the husband's hands by virtue of the marriage, as the court from the circumstances of the case shall deem equitable.

Sec. 5. Whenever the divorce shall be occasioned by adultery, or other of the causes aforesaid, done or committed on the part of the wife, the husband shall hold the personal estate not secured to her by law, forever, and her real estate not secured to her by law during his natural life, in case they have had issue born alive of her body during the marriage, otherwise during her natural life only, if he shall survive her.

Sec. 6. The court may, in such case, allow the wife for her subsistence so much of her real and personal estate as they shall deem necessary or proper.

Sec. 7. Whenever a divorce is granted for adultery, or crime on the part of the husband, the wife shall be entitled to dower in the same manner as if he were dead, unless the court shall decree alimony, chargeable upon the estate of the husband, instead of such dower.

Sec. 8. Whenever a divorce shall be had for adultery, or for any of the causes aforesaid, done or committed on the part of the husband, the wife shall continue to hold all her property, real and personal, secured to her by law, free from any right in or control over her disposition of the same, either during her life or at her death; and, if there be no issue living, shall be restored to all other her lands, tenements and hereditaments, if any there be.

Sec. 9. In such case the wife shall also be allowed out of the real or personal estate of the husband, or out of both, such alimony as the court shall think reasonable, not exceeding the use of one moiety of his real estate, during the life of the wife, and the property of one-half of his personal estate, having regard to the personal property that came to the husband by the marriage, and his ability.

Sec. 10. If there be issue living at the time of the divorce, the court, with regard to ordering restoration to the wife of such of her lands, tenements or hereditaments, if any, as may not be secured to her by law, and in regard to the amount of alimony to be allowed her out of the property of the husband, may do as they shall judge the circumstances of the case may require.

Sec. 11. Divorces from bed, board, and future cohabitation, until the parties be reconciled, may be granted for any of the causes for which by law a divorce from the bond of marriage may be decreed, and for such other causes as may seem to require the same.

SEC. 12. In case of such divorce, the court may assign to the petitioner a separate maintenance out of the estate or property, of the husband or wife, as the case may be, in such manner and of such amount as they may think necessary or proper.

SEC. 13. Every petition shall be signed by the petitioner, if of sound mind and of legal age to consent to marriage, otherwise upon application to the court, and after notice to the party in whose name the petition shall be filed, the court may allow such petition to be signed by a guardian or next friend.

SEC. 14. All jurisdiction over divorce, alimony, separate maintenance, or the custody, education, and support of the children of persons divorced or petitioning for a divorce, is vested in the supreme court.

SEC. 15. Said court shall have no cognizance of or jurisdiction over any petition for the same, or either of the same, unless the petitioner shall, at the time of preferring such petition, be a domiciled inhabitant of this state, and have resided therein for the period of one year, next before the preferring of such petition.

SEC. 16. All such petitions shall be filed, heard and tried in the county in which the petitioner shall reside.

SEC. 17. The said court may, by general rule or otherwise, prescribe the notice to be given, within or without the state, on such petitions, and may issue such process as may be necessary to carry into effect all powers conferred upon them in relation to the same.

SECTIONS 18, 19 and 20 contain provisions in relation to citations to adverse party residing without the state, or in parts unknown.

SEC. 21. Whenever any citation, issued under the provisions of this chapter, shall be served by a disinterested person, such person shall return the same, having made oath thereon of the place where, the time when, and the manner in which he shall have made service of the said citations.

SECTION 22 provides for giving and ensuring proper and sufficient notice to the adverse party.

SEC. 23. The said court is empowered to regulate the custody, and provide for the education, maintenance and support of the children of all persons by them divorced or petitioning for a divorce, and of all persons to whom a separate maintenance may be granted, or who may petition for the same; to make such allowance to the wife, out of the estate of her husband, for the purpose of enabling her to prosecute or defend against any such petition for divorce or separate maintenance, in case she has no property of her own available for such purposes, as they may think reasonable and proper; and to make all necessary orders and decrees concerning the same, and the same at any time to alter, amend and annul for sufficient cause, after notice to the parties interested therein.

SEC. 24. The said court may authorize a married woman to whom a divorce from the bond of marriage is decreed to change her name, with the same rights and liabilities as if her name had not been changed.

Sec. 25. After the filing and during the pendency of any petition under this chapter, the supreme court may, as in equity, make such interlocutory decrees, or grant such temporary injunctions as may be necessary, until a hearing can be had before the court.

CHAPTER 198.

OF DIVORCES.

Section 5. The clerks of the supreme courts in the several counties shall make returns to the secretary of the state board of health, on or before the first day of March in each and every year, for the year ending on the thirty-first day of December preceding, of all the applications for divorce, showing the number, the number granted, and the causes which are given for the application, but without the names of the parties, in accordance with the blanks which shall be furnished them by the secretary of the state board of health.

INDEX.

See also CONTENTS, *page V.*